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Dräger medical
A Dräger and Siemens Company

Setup and Installation Manual

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Narkomed 2B Anesthesia System

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Setup and Installation Manual

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Section 1
Introduction

Introduction

This manual provides instructions for moving, setting up, and testing a NARKOMED 2B anesthesia machine.

- **Moving the Machine**—Section 2 shows how to move the machine safely.
- **Setup and Installation**—The following sections explain how to set up and install the anesthesia machine. The setup and installation must be performed by, or under the direct supervision of, an authorized North American Dräger representative.
  - Section 3 outlines installation of the breathing circuit components, sensors, and optional equipment such as vaporizers, scavenger systems, second shelf, and auxiliary lamp.
  - Section 4 explains how to connect the gas supplies to the machine and notes the precautions to be observed when making those connections.
  - Section 5 provides instructions for connecting the anesthesia machine to electrical power and verifying correct power-up.
- **Test Procedure**—Section 6 contains instructions for testing the machine using the Periodic Manufacturer's Certification (PMC) procedure. The machine must be tested following setup and installation. The test procedure must be performed by, or under the direct supervision of, an authorized North American Dräger representative.

  NOTE: The PMC procedure must also be performed periodically to ensure that the machine is ready for service.

Refer to the *NARKOMED 2B Operator's Manual* for cleaning and routine maintenance procedures.

Warnings, Cautions, and Notes

This manual contains warning, caution, and note statements. Each type of statement has a specific interpretation.

- **Warnings**—Give important information that, if ignored, could result in personal injury.
- **Cautions**—Give important information that, if ignored could lead directly to equipment damage and, indirectly, to a patient's injury.
- **Notes**—Clarify information that may not be readily obvious, such as a secondary cause and effect.

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Section 2
Moving the Narkomed 2B

Getting the Machine Ready to Move

Prepare the machine so that it can be moved safely:

- unplug the power cord
- retract the boom arm
- disconnect all external hoses
- remove all external monitors and equipment
- remove the absorber system

Moving the Machine

Perform the following steps to move the anesthesia machine.

WARNING: The anesthesia machine should only be moved by people who are physically capable of handling its weight. North American Dräger recommends that two people move the anesthesia machine to aid in maneuverability. Exercise special care so that the machine does not tip when moving up or down inclines, around corners, and across thresholds (for example, in door frames and elevators). Do not attempt to pull the machine over any hoses, cords, or other obstacles on the floor.

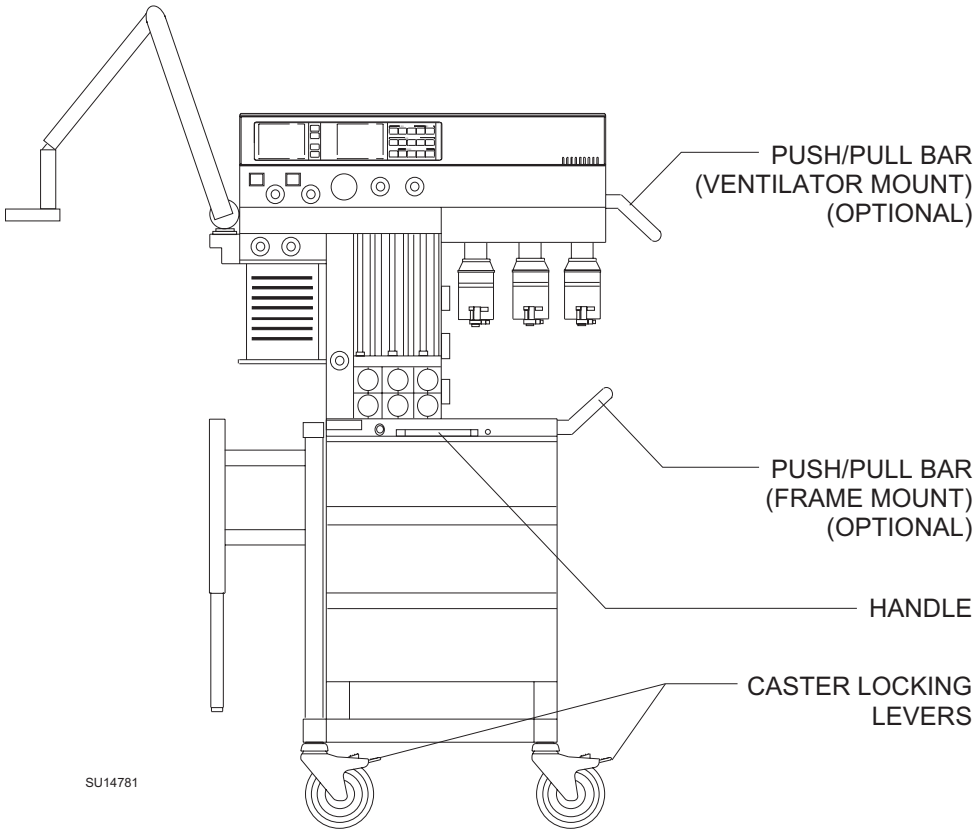
1. Unlock the front casters by stepping on their locking levers.

   Do not attempt to move the machine while the casters are locked.

2. Using only the handle or push/pull bar shown in the illustration, move the machine.

   Do not push or pull the anesthesia machine using the absorber system, vaporizers, ventilator bellows, cord wrap, or boom arm.

Section 2
Moving the Narkomed 2B



Section 3
Setup and Installation

Setup Checklist

Following is a checklist for the initial setup of a NARKOMED 2B Anesthesia Machine. This setup must be performed by or under the direct supervision of an authorized North American Dräger service representative. Items 1 thru 17 are described in this section; items 18 thru 20 are outlined in subsequent sections.

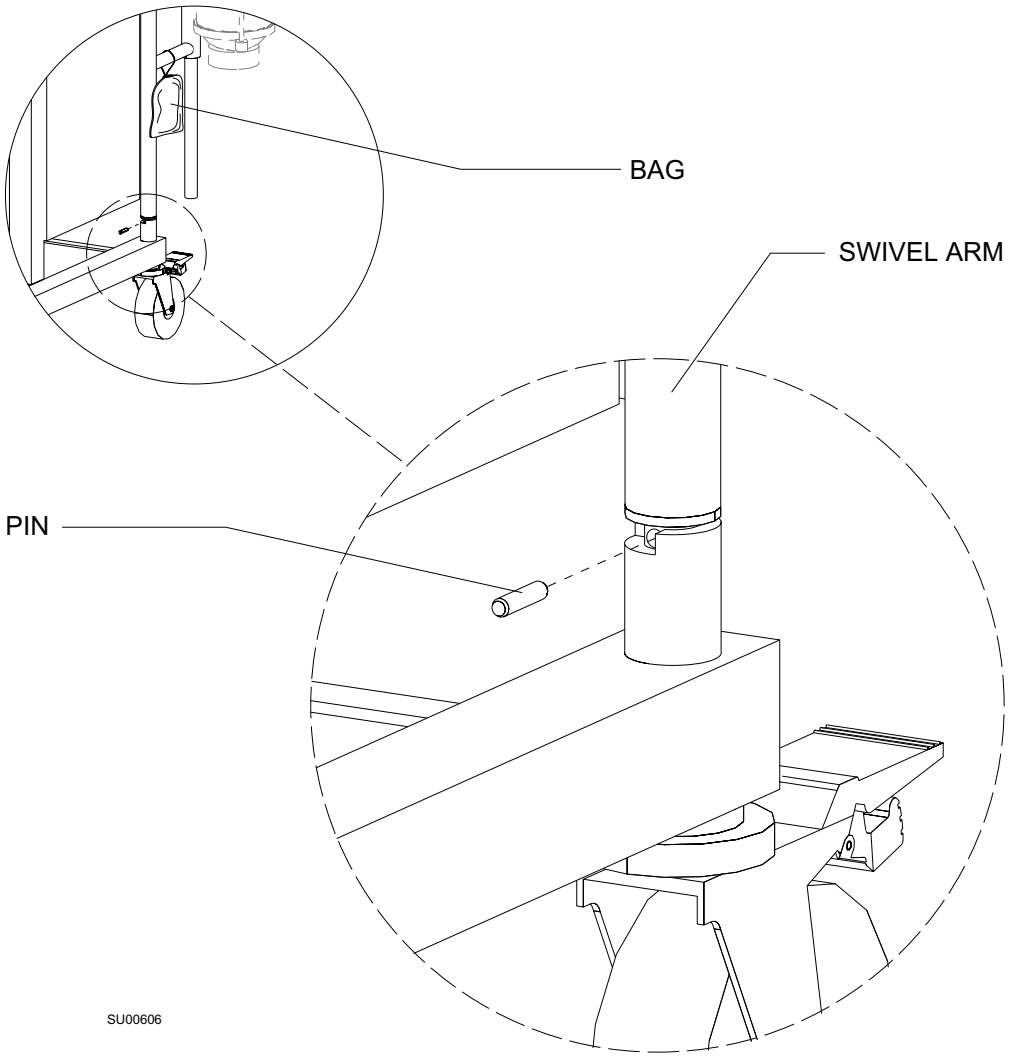
1. Secure the swivel arm
2. Install the vaporizers (optional)
3. Install the absorber system (optional)
4. Install the breathing pressure pilot line
5. Install the AUTO/BAG sensor cord
6. Install the oxygen sensor
7. Install the respiratory volume sensor
8. Install the Bain Circuit adapter (optional)
9. Install the fresh gas oxygen sensor adapter (optional)
10. Connect the open reservoir scavenger system (optional)
11. Connect the passive scavenger system (optional)
12. Install the patient line boom arm (optional)
13. Install the manual sphygmomanometer gauge (optional)
14. Install the second shelf (optional)
15. Install the shelf extender (optional)
16. Install the auxiliary lamp (optional)
17. Install the outlet strip (optional)
18. Connect the gas supplies
19. Connect the machine to electrical power
20. Perform a Periodic Manufacturer's Certification (PMC) procedure. This procedure must be performed by an authorized North American Dräger service representative as part of the initial setup.

Section 3
Setup and Installation

Securing the Swivel Arm

Secure the swivel arm as follows:

1. Remove the pin from the bag hanging on the swivel arm.
2. Rotate the swivel arm so that the hole near the bottom of the arm faces the back of the machine.
3. Hammer the pin into the hole until it is flush with the swivel arm.



Section 3
Setup and Installation

Selecting the Vaporizer Order

You must install the vaporizers in the following order, as viewed from the front of the machine, unless otherwise specified by the customer:

Left position:	Halothane
Center position:	Enflurane
Right position:	Isoflurane (or desflurane)

NOTE: To install a TEC 6 desflurane vaporizer, see Service Procedure SP00091.

Installing the Vaporizers (Optional)

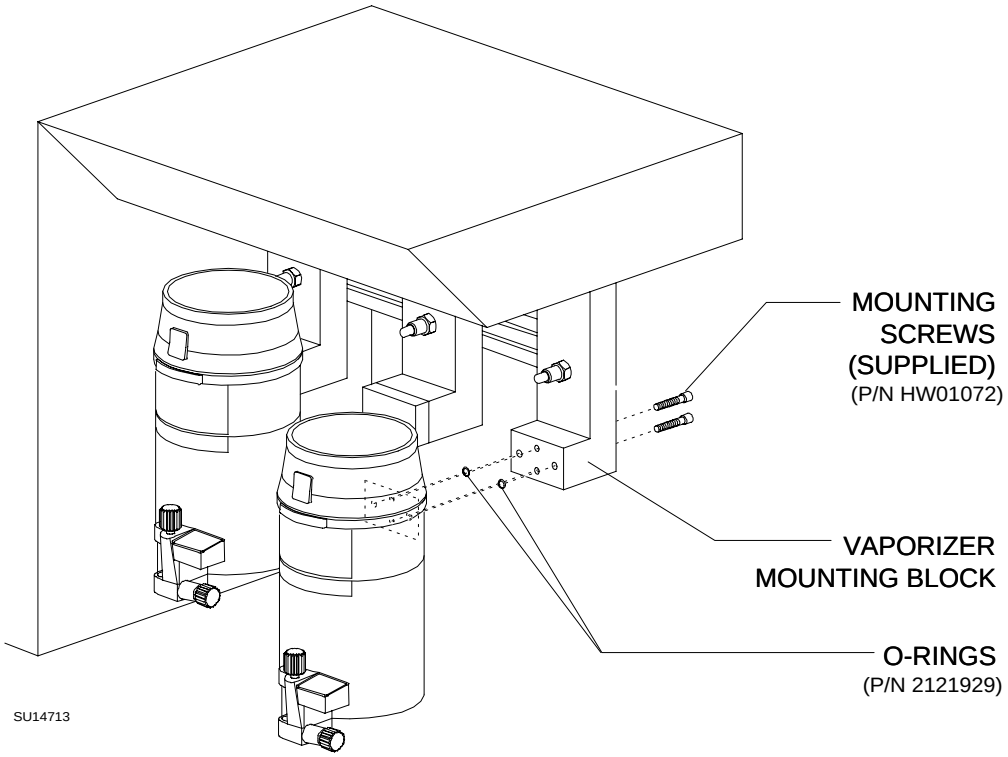
To install the vaporizer during initial setup:

1. Remove the cover from the vaporizer mounting block.
2. Remove the vaporizer from its shipping container.
3. Remove the tape from the back of the vaporizer. Verify that the vaporizer's O-rings are present at the inlet and outlet ports.
4. Use the supplied screws to secure the vaporizer to the vaporizer mounting block in the correct position on the machine. (See "Selecting the Vaporizer Order" above.) Tighten the screws to a torque of 285 N cm (25 inch pounds).

   WARNING: Do not use any screws other than the ones supplied with the machine.

5. Test the exclusion system for proper operation.

Section 3
Setup and Installation



Filling the Vaporizer

See the appropriate separate manual, supplied with vaporizers available for use with the Narkomed 2B.

Handling the Vaporizer

If a vaporizer is dropped during handling, or if its handwheel exhibits a lack of resistance (spins freely), or if a gas analyzer maintains a zero reading after the handwheel has been turned to a labeled concentration, do not use the vaporizer. Return the vaporizer to the North American Dräger Technical Service Department.

Installing the Absorber System

Install the absorber system as described below. This installation procedure presumes the use of an appropriate scavenger system.

WARNING: The NARKOMED 2B's patient breathing system must not be used in conjunction with any additional components that establish a flow direction.

WARNING: Hoses and bags attached to the 22 mm hose terminals of the inspiratory valve, expiratory valve, ventilator hose connection, and breathing bag mount must comply with current ANSI standards.

1. Place the absorber mounting stud into the top of the absorber pole. Be sure that the O-ring is on the mounting stud.

2. Tighten the set screw on the absorber pole to lock the absorber in place.

WARNING: Do not pinch or kink the fresh gas hose leading from the fresh gas common outlet to the absorber.

3. Pull out the fresh gas locking bar, located on the front of the NARKOMED 2B, to its extended position. Insert the 15 mm male fitting on the fresh gas hose axially into the 15 mm female terminal. Release the spring-loaded locking bar over the fitting, allowing it to "lock" the fitting into place.

WARNING: To prevent leaks and misdirection of gas pathways, all hoses should be correctly and tightly fitted, as shown in the illustrations. Take special care to make sure that all 19 mm hoses are attached to the proper 19 mm connectors. Possible machine malfunction and harm to the patient could occur if the scavenger hoses are attached to any 22 mm connection.

4. Attach a 22 mm breathing hose between the ventilator bellows 22 mm terminal marked VENTILATOR HOSE, and the 22 mm terminal on the rear of the manual/automatic selector valve marked VENTILATOR HOSE.

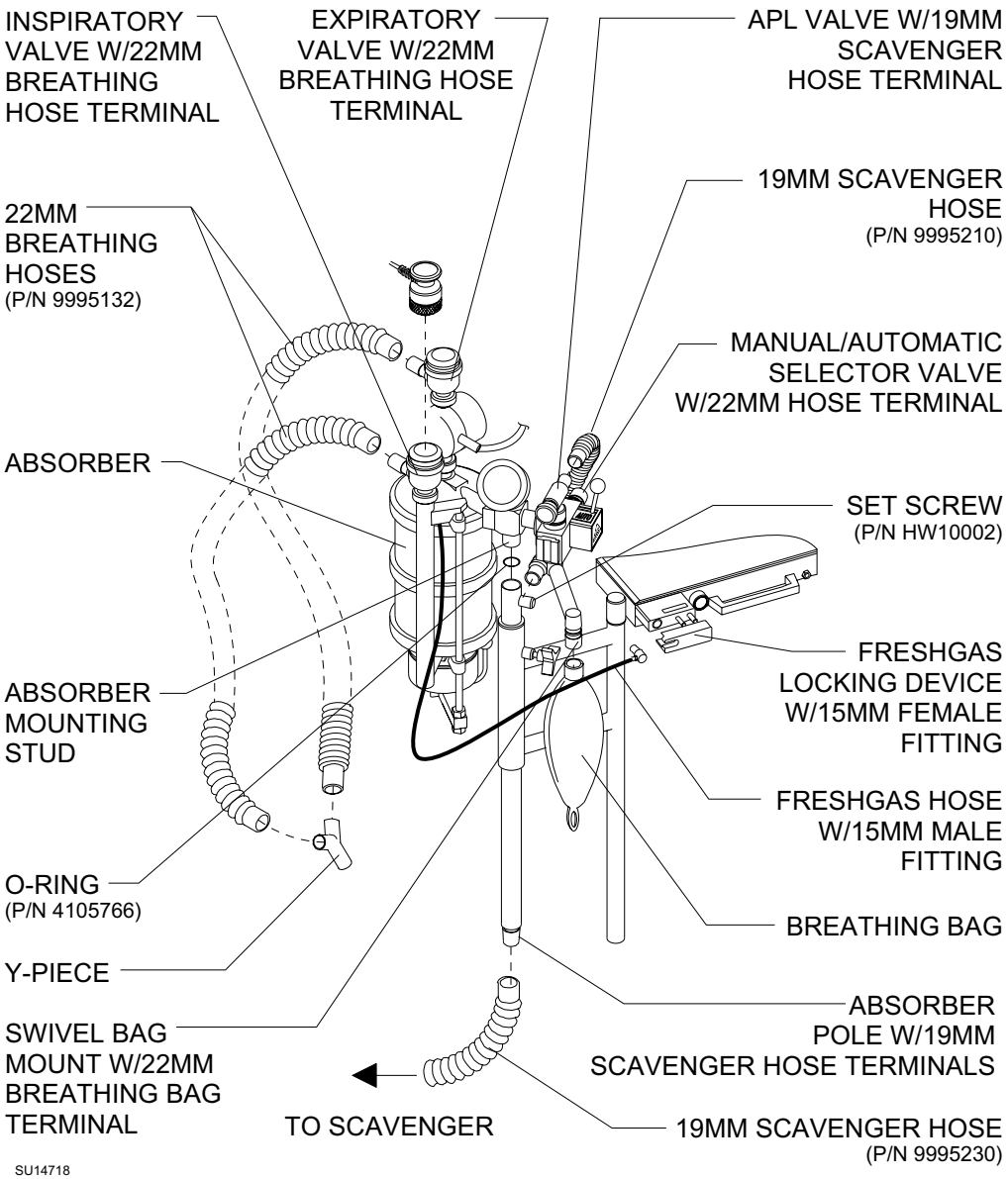
5. Attach a 22 mm breathing hose between the 22 mm hose terminal on the inspiratory valve marked INSPIRATION, and one side of the Y-piece.

Section 3
Setup and Installation

WARNING: To ensure proper direction of gas flow during inspiratory and expiratory phases, the disks in the inspiratory and expiratory valves must move freely, without sticking.

6. Attach a 22 mm breathing hose between the other side of the Y-piece, and the 22 mm hose terminal on the expiratory valve marked EXPIRATION.

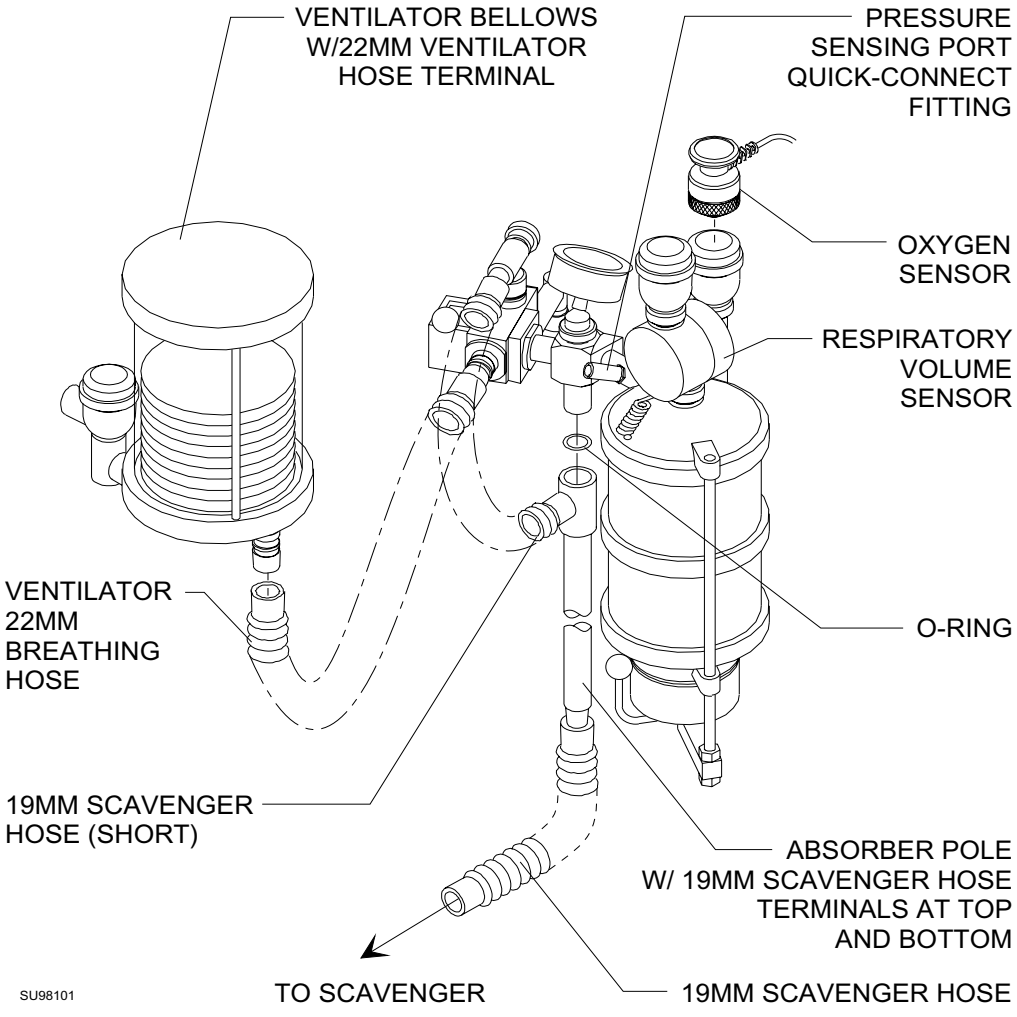
7. Attach the breathing bag to the swivel bag mount 22 mm terminal marked BREATHING BAG.


INSPIRATORY VALVE W/22MM BREATHING HOSE TERMINAL
EXPIRATORY VALVE W/22MM BREATHING HOSE TERMINAL
APL VALVE W/19MM SCAVENGER HOSE TERMINAL
19MM SCAVENGER HOSE (P/N 9995210)
22MM BREATHING HOSES (P/N 9995132)
MANUAL/AUTOMATIC SELECTOR VALVE W/22MM HOSE TERMINAL
ABSORBER
SET SCREW (P/N HW10002)
FRESHGAS LOCKING DEVICE W/15MM FEMALE FITTING
ABSORBER MOUNTING STUD
FRESHGAS HOSE W/15MM MALE FITTING
O-RING (P/N 4105766)
BREATHING BAG
Y-PIECE
ABSORBER POLE W/19MM SCAVENGER HOSE TERMINALS
SWIVEL BAG MOUNT W/22MM BREATHING BAG TERMINAL
TO SCAVENGER
19MM SCAVENGER HOSE (P/N 9995230)
SU14718

WARNING: The breathing bag acts as a pressure limiting device during manually assisted and spontaneous ventilation. Therefore, breathing bags used with the Absorber system must comply with the pressure/volume requirements of current ANSI standards. A stretched breathing bag may have drastically altered compliance characteristics, and altered conductivity in the case of conductive bags.

8. Connect the 19 mm scavenger hose between the 19 mm terminal marked SCAVENGER HOSE on the bottom of the absorber pole and the 19 mm terminal marked SCAVENGER HOSE on the scavenger.

9. Connect the 19 mm scavenger hose between the 19 mm terminal marked SCAVENGER HOSE on the rear of the APL valve and the 19 mm terminal marked SCAVENGER HOSE on the rear of the absorber pole.



Section 3
Setup and Installation

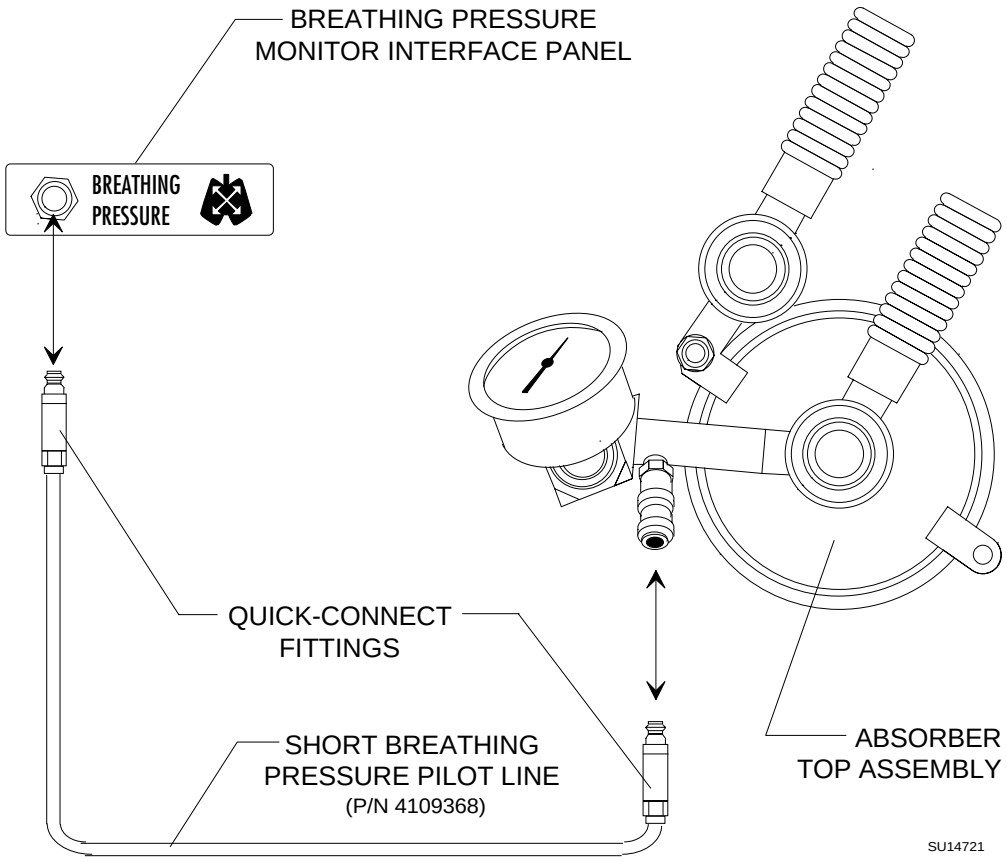
Installing the Breathing Pressure Pilot Line

North American Dräger anesthesia systems are supplied with two breathing pressure pilot lines. A shorter one for breathing pressure monitoring at the absorber, and a longer one for breathing pressure monitoring at the Y-piece.

For breathing pressure monitoring at the absorber, install the shorter pilot line (which has quick-connect fittings on both ends) as follows:

1. Connect one end of the pilot line to the fitting mounted on the rear of the pipe extending from the absorber top assembly.

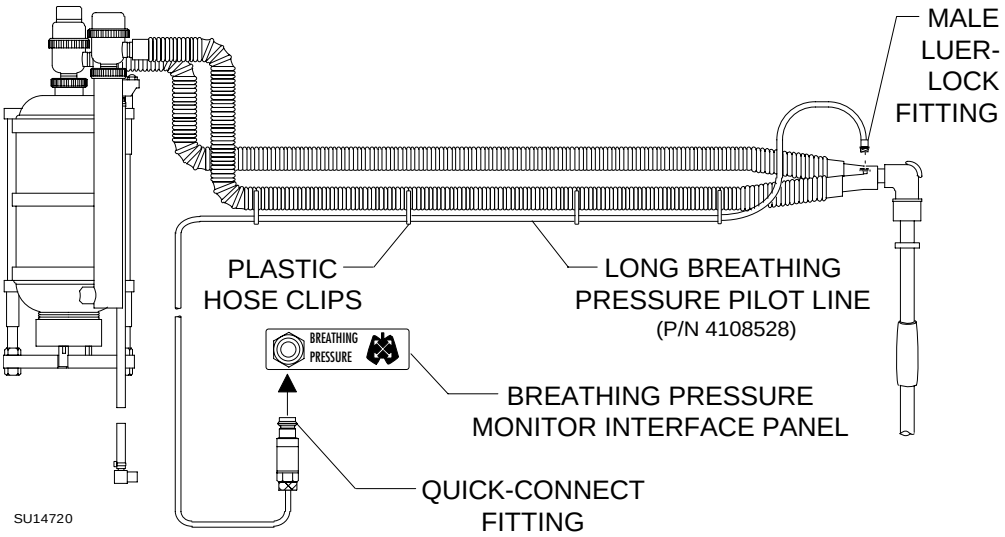
2. Connect the other end of the pilot line to the breathing pressure monitor interface panel.



For breathing pressure monitoring at the patient Y-piece, install the longer pilot line (which has a quick-connect fitting on one end and a Luer type fitting on the other end) as follows:

1. Insert the quick-connect fitting on the pilot line into the breathing pressure monitor interface panel.

2. Connect the Luer fitting on the other end of the pilot line to a Luer fitting on either the patient Y-piece or a 15 mm adapter on the patient side of the Y-piece. Use the four plastic hose clips attached to the pilot line to mount it on either of the breathing hoses leading to the Y-piece.

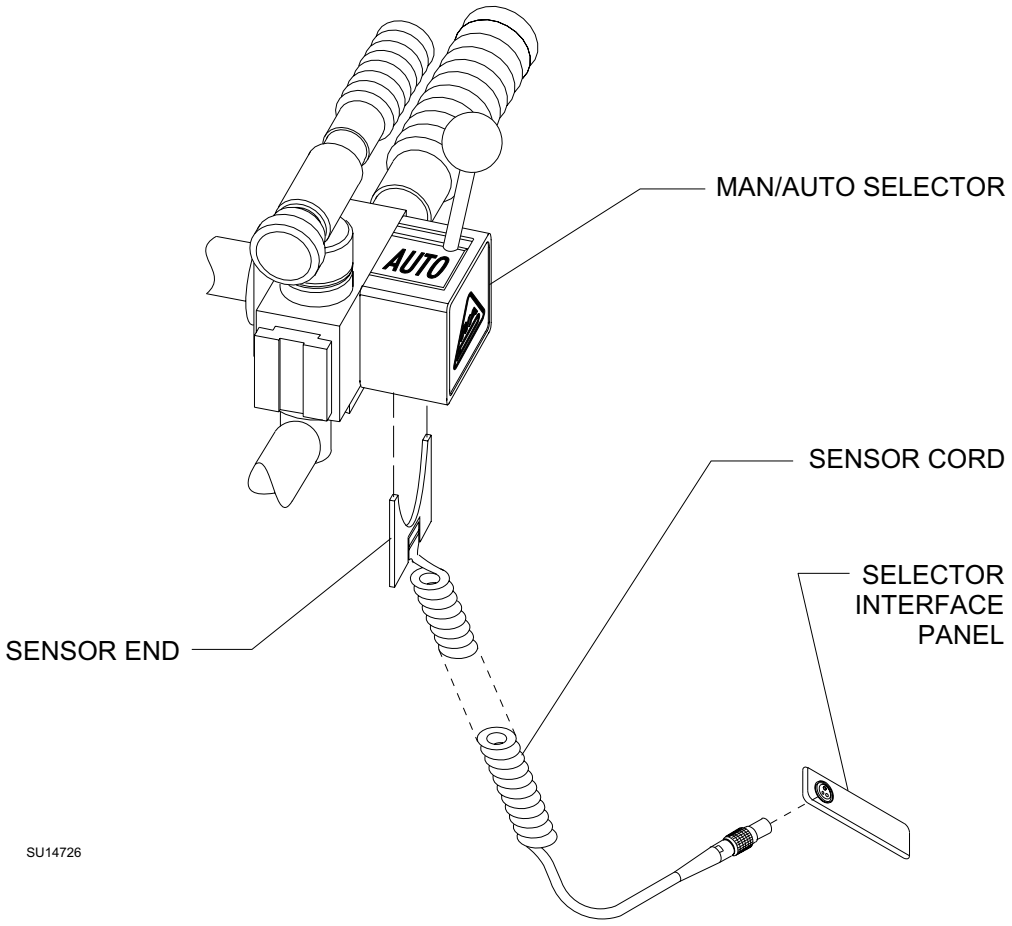


Section 3
Setup and Installation

Installing the AUTO/BAG Sensor Cord

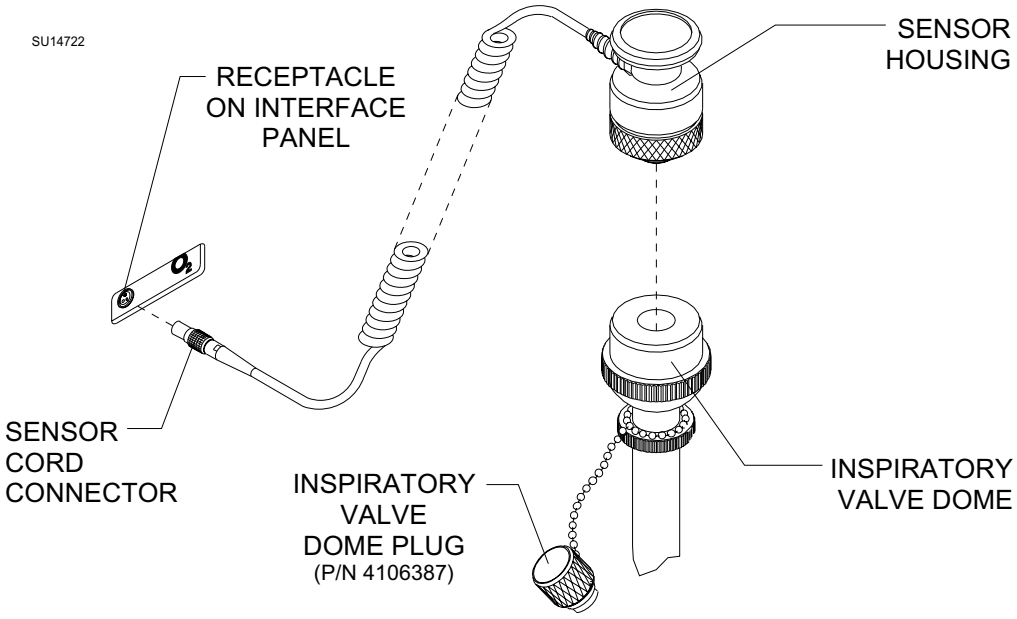
1. Insert the sensor end of the sensor cord into the underside of the Man/Auto selector housing. Note that the sensor is keyed and will only fit into the selector housing one way. Push the sensor into the selector housing until it snaps into place.

2. Plug the other end of the sensor cord into the receptacle on the SELECTOR interface panel on the machine. Align the key on the connector with the keyway on the receptacle, and push the connector in until it snaps into place.



Installing the Oxygen Sensor

1. Remove the inspiratory valve dome plug from the inspiratory valve dome.
2. Connect the sensor cord to the receptacle on the O_2 sensor interface panel.
3. Remove any protective covering from the sensor housing.
4. Perform an oxygen sensor calibration as described in *Operation - Oxygen Analysis* in the *Narkomed 2B Operator's Manual.*
5. Insert the sensor assembly into the inspiratory valve dome by pressing it into place.



Installing the Respiratory Volume Sensor

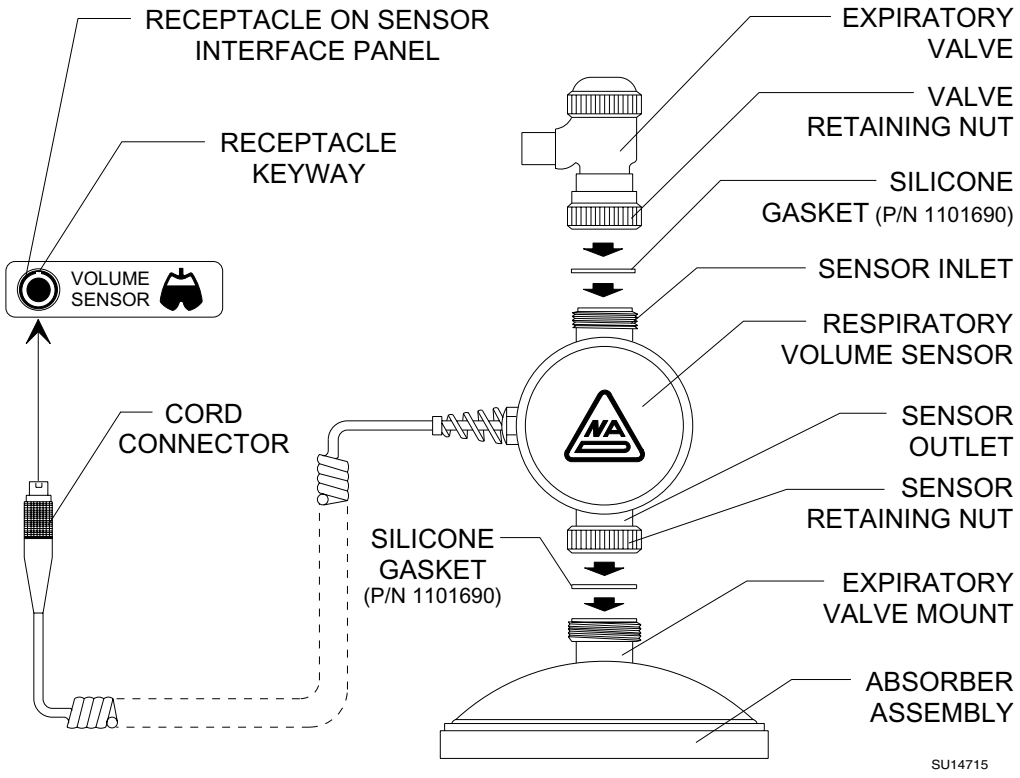
1. Remove the expiratory valve from the absorber assembly by unscrewing the valve retaining nut.
2. Verify that the silicone gasket above the threads of the absorber expiratory valve mount is properly seated.
3. Attach the respiratory volume sensor to the absorber assembly by positioning the sensor at the location previously occupied by the expiratory valve, and then hand-tighten the sensor retaining nut. (The sensor retaining nut is specific to the expiratory valve mount and will not fit the inspiratory valve mount.)

Section 3
Setup and Installation

4. Verify that the silicone gasket is properly seated above the threads of the respiratory volume sensor inlet.

5. Attach the expiratory valve to the top of the sensor inlet by threading the valve retaining nut onto the sensor inlet. Hand-tighten the valve retaining nut.

6. Connect the sensor cord to the VOLUME SENSOR receptacle on the sensor interface panel. Align the key on the sensor cord connector with the receptacle keyway.



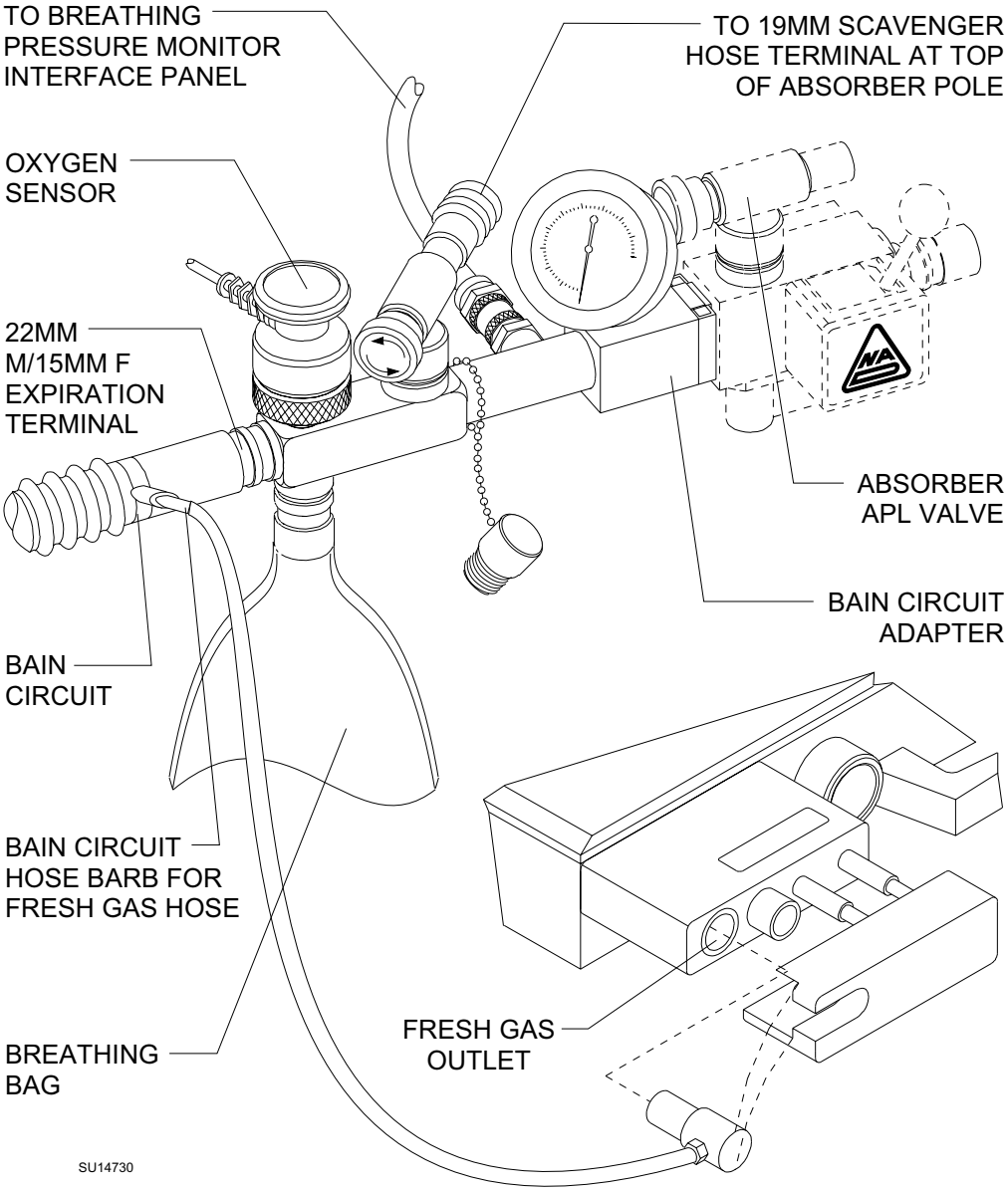
Installing the Bain Circuit Adapter (Optional)

Two types of Bain Circuit adapters are available. One mounts to the absorber; the other mounts to the absorber pole.

Absorber Mount

To install the absorber-mounted Bain Circuit Adapter, slip the mounting bracket of the Bain Circuit Adapter down over the slide mount on the absorber assembly (on the block below the APL valve).

WARNING: To avoid confusion between hose terminals on the absorber system and the Bain Circuit Adapter, always remove the Bain Circuit Adapter from the absorber mount when the Bain Circuit Adapter is not in use.


TO BREATHING PRESSURE MONITOR INTERFACE PANEL
TO 19MM SCAVENGER HOSE TERMINAL AT TOP OF ABSORBER POLE
OXYGEN SENSOR
22MM M/15MM F EXPIRATION TERMINAL
ABSORBER APL VALVE
BAIN CIRCUIT ADAPTER
BAIN CIRCUIT
BAIN CIRCUIT HOSE BARB FOR FRESH GAS HOSE
FRESH GAS OUTLET
BREATHING BAG
SU14730

Section 3
Setup and Installation

Pole Mount

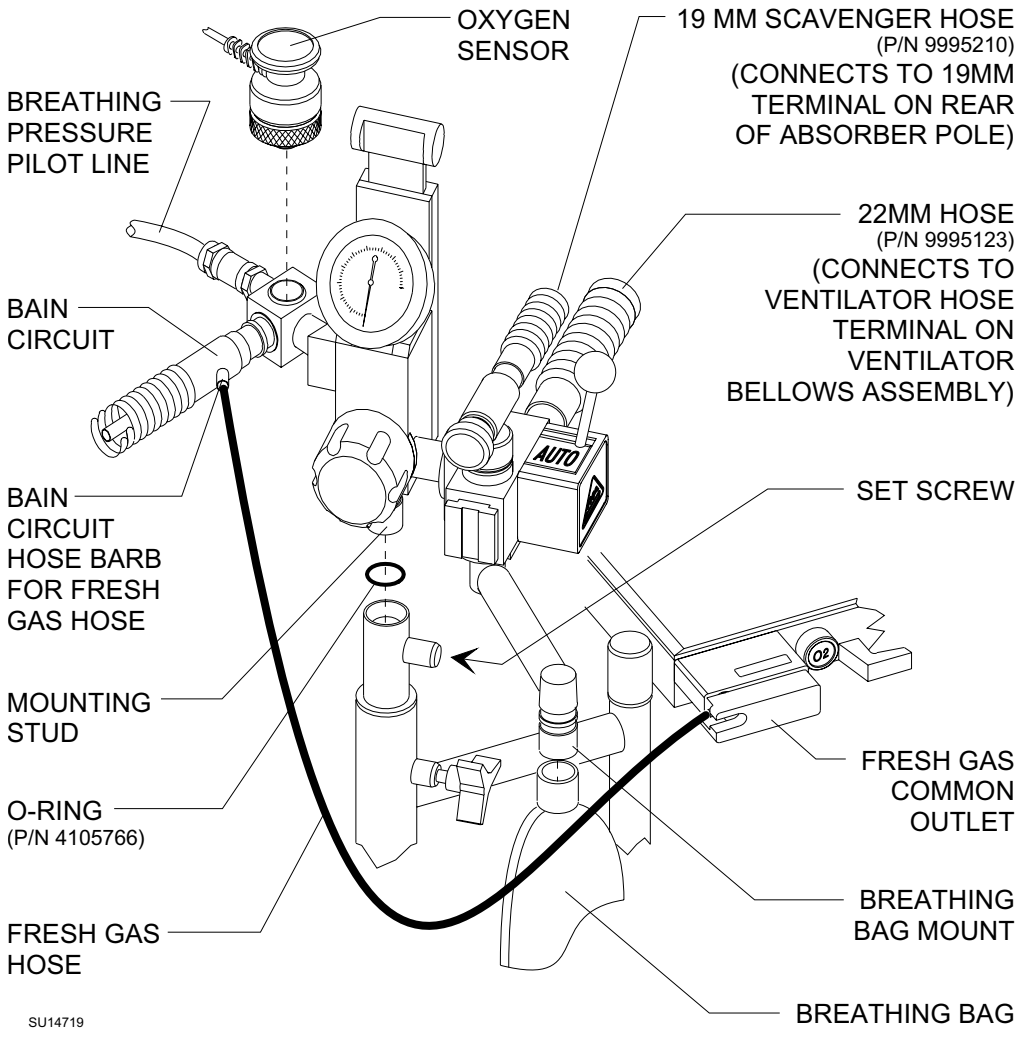
The Bain Circuit Adapter that mounts on the absorber pole may be supplied with an optional positive end-expiratory pressure (PEEP) valve.

To install a pole-mounted Bain Circuit Adapter, with or without a PEEP valve:

1. Loosen the set screw on the absorber pole and remove the absorber system (if the machine is so equipped).

2. Slip the Bain Circuit Adapter mounting stud into the absorber pole on the swivel arm. Be sure that the O-ring is in place on the mounting stud.

3. Tighten the set screw on the absorber pole to lock the Bain Circuit Adapter in place.


OXYGEN SENSOR
19 MM SCAVENGER HOSE (P/N 9995210) (CONNECTS TO 19MM TERMINAL ON REAR OF ABSORBER POLE)
BREATHING PRESSURE PILOT LINE
22MM HOSE (P/N 9995123) (CONNECTS TO VENTILATOR HOSE TERMINAL ON VENTILATOR BELLOWS ASSEMBLY)
BAIN CIRCUIT
AUTO
BAIN CIRCUIT HOSE BARB FOR FRESH GAS HOSE
SET SCREW
MOUNTING STUD
O2
FRESH GAS COMMON OUTLET
O-RING (P/N 4105766)
BREATHING BAG MOUNT
FRESH GAS HOSE
BREATHING BAG
SU14719

Bain Circuit Oxygen Sensor Installation

1. Insert the oxygen sensor into the port adjacent to the expiratory terminal. When the port is not in use, close it with the provided plug. Connect the sensor cable to the sensor interface panel as described earlier in this section.

WARNING: A functioning oxygen analyzer must always be used with the Bain Circuit Adapter.

2. Connect the breathing pressure pilot line to the quick-connect fitting on the bain circuit adapter. Connect the other end of the pilot line to the sensor interface panel as described earlier in this section.

WARNING: A functioning breathing pressure monitor must always be used with the Bain Circuit Adapter.

Bain Circuit Connections

1. Install the breathing bag onto the terminal labeled BREATHING BAG.

WARNING: Breathing bags attached to the Bain Circuit Adapter's 22 mm terminals must comply with current ANSI standards.

2. Connect the 19 mm scavenger hose between the 19 mm terminal at the rear of the APL valve marked SCAVENGER HOSE and the 19 mm terminal on the rear of the absorber pole marked SCAVENGER HOSE.

3. If applicable, connect a 22 mm hose between the terminal on the rear of the manual/automatic selector valve, and the VENTILATOR HOSE terminal on the bottom of the ventilator bellows assembly.

WARNING: Hoses connected to the Bain Circuit Adapter terminals must comply with current ANSI standards.

4. Connect the Bain Circuit to the 22 mm male/15 mm female terminal on the Bain Circuit Adapter marked EXPIRATION.

5. Connect the fresh gas hose between the fresh gas outlet on the NARKOMED 2B, and the hose barb fitting on the Bain Circuit (inner tube connection).

6. Set the APL valve fully open, set the PEEP valve (if supplied) at minimum, and set the Man/Auto selector to BAG.

WARNING: The fresh gas hose must not be pinched or kinked.

Section 3
Setup and Installation

Installing the Fresh Gas Oxygen Sensor Adapter (Optional)

1. Hold the locking bar on the anesthesia machine's fresh gas outlet in the extended position.

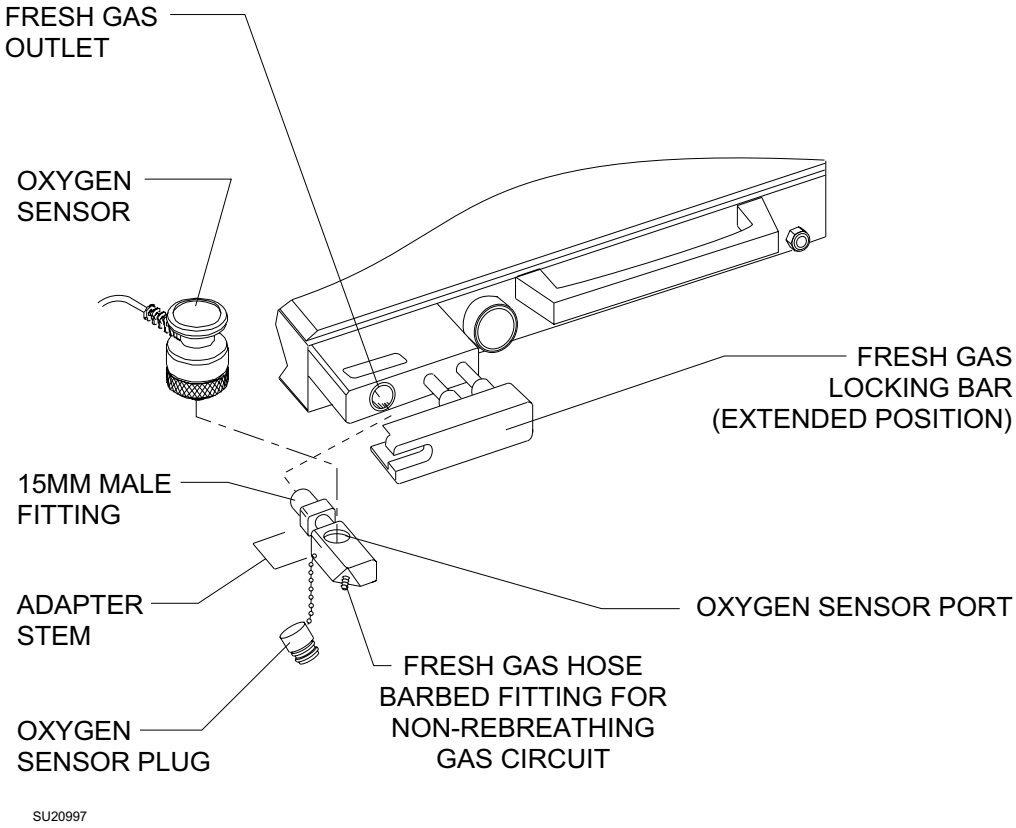
2. With the oxygen sensor port facing up, slide the notched portion of the adapter stem into the retaining slot of the locking bar, so that the adapter's 15 mm male fitting faces the anesthesia machine's fresh gas outlet.

3. Release the locking bar, guiding the adapter's 15 mm male fitting into the fresh gas outlet of the anesthesia machine.

4. Insert the oxygen sensor into the port on top of the adapter.

WARNING: If the oxygen sensor is removed, the oxygen sensor port must be closed with the oxygen sensor port plug.

5. Attach the non-rebreathing circuit fresh gas hose to the adapter's barbed fitting. (For non-rebreathing circuits equipped with a 15 mm fresh gas connector, cut off the connector and press the hose onto the barbed fitting of the adapter.)



Connecting the Open Reservoir Scavenger System (Optional)

The Open Reservoir Scavenger is installed on the NARKOMED 2B before shipping. The scavenger hose connections are described below.

CAUTION: Take special care not to accidentally force 19 mm scavenger hoses over 22 mm breathing hose terminals. Carefully follow the hose connection instructions for installing the scavenger and the absorber.

1. Connect a 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the bottom of the absorber pole and the 19 mm terminal (marked SCAVENGER HOSE) on the right side of the scavenger.

WARNING: The 19 mm scavenger hoses leading from the absorber must not be pinched, kinked, or blocked in any manner.

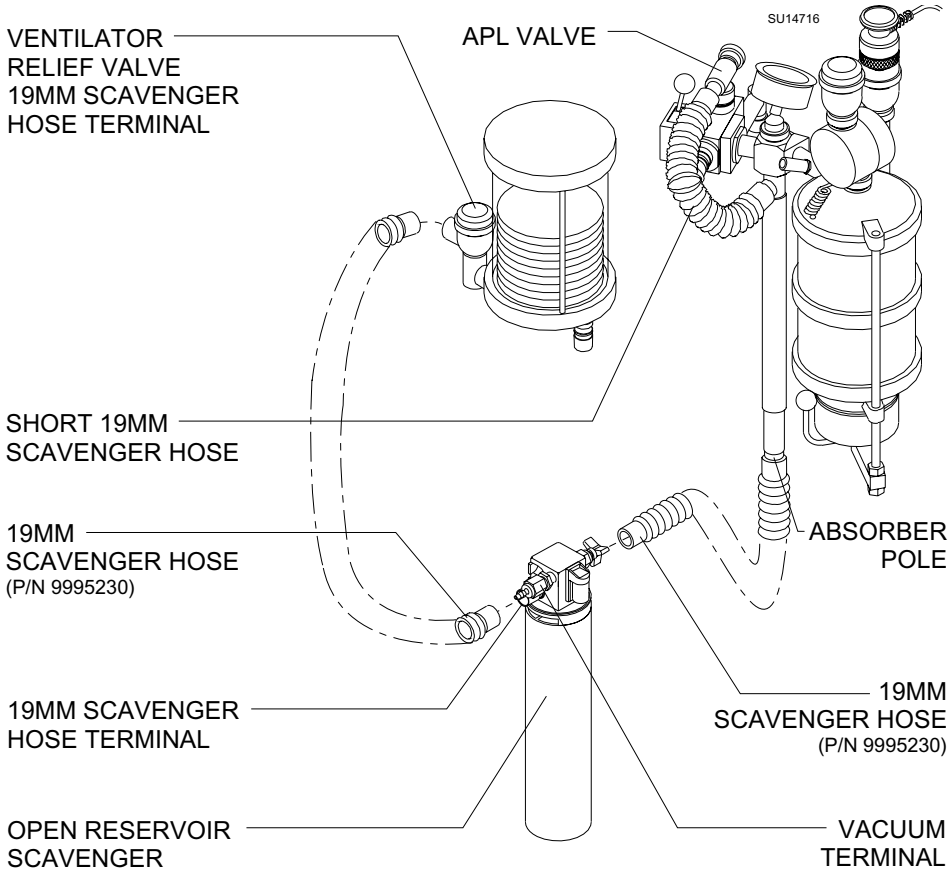
2. Connect the short 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the rear of the APL valve and the 19 mm terminal (marked SCAVENGER HOSE) on the rear of the absorber pole.

3. Connect another 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the ventilator relief valve and the 19 mm terminal (marked SCAVENGER HOSE) on the left side of the scavenger.

WARNING: The 19 mm scavenger hose leading from the ventilator relief valve must not be pinched, kinked, or blocked in any manner.

4. Connect a wall suction hose between the wall suction outlet and the suction terminal (DISS fitting or hose barb with adapter) on the scavenger.

Section 3
Setup and Installation



Connecting the Scavenger Interface for Passive Systems (Optional)

The Scavenger Interface for Passive Systems is installed on the NARKOMED 2B before shipping. The scavenger hose connections are described below.

CAUTION: Take special care not to accidentally force 19 mm scavenger hoses over 22 mm breathing hose terminals. Carefully follow the hose connection instructions for installing the scavenger and the absorber.

1. Connect a 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the bottom of the absorber pole and the 19 mm terminal (marked SCAVENGER HOSE) on the right side of the scavenger.

WARNING: The 19 mm scavenger hoses leading from the absorber must not be pinched, kinked, or blocked in any manner.

2. Connect the short 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the rear of the APL valve and the 19 mm terminal (marked SCAVENGER HOSE) on the rear of the absorber pole.

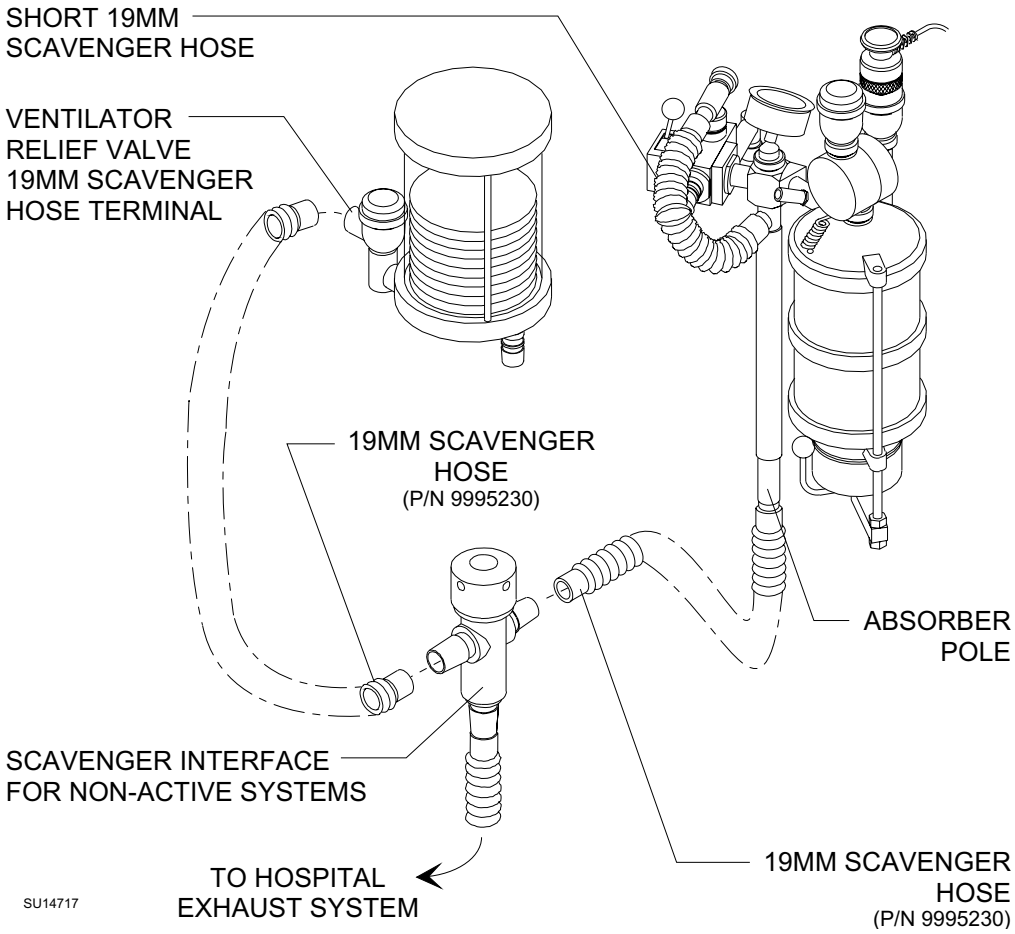
3. Connect another 19 mm scavenger hose between the 19 mm terminal (marked SCAVENGER HOSE) on the ventilator relief valve and the 19 mm terminal (marked SCAVENGER HOSE) on the left side of the scavenger.

WARNING: The 19 mm scavenger hose leading from the ventilator relief valve must not be pinched, kinked, or blocked in any manner.

NOTE: If only one of the 19 mm hose terminals will be used, the unused terminal should be capped with the provided input port cap.

4. Connect another 19 mm scavenger hose between the 19 mm terminal labeled EXHAUST (on the bottom of the scavenger) and the hospital exhaust system grill adapter.

Section 3
Setup and Installation



Installing the Optional Patient Line Boom Arm (Optional)

Refer to the instructions supplied with the boom arm.

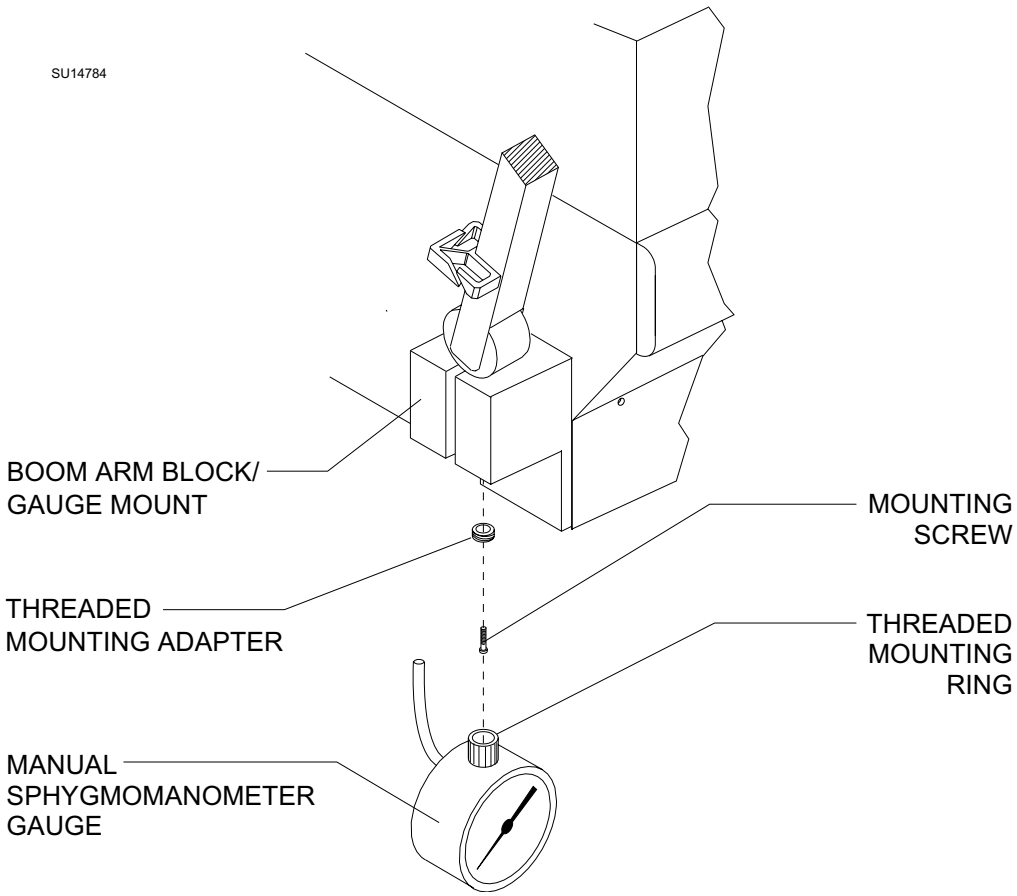
Installing the Manual Sphygmomanometer Gauge (Optional)

The manual sphygmomanometer gauge is installed on either the underside of the optional patient line boom arm or, if there is no boom arm, directly to the side of the machine. (For machines with the optional O.R. Data Manager, the gauge is installed on the O.R. Data Manager. For instructions, refer to the display arm installation in the *O.R. Data Manager Setup and Installation Manual*.)

1. If the machine has a boom arm, attach the gauge to the boom arm mounting block as follows:

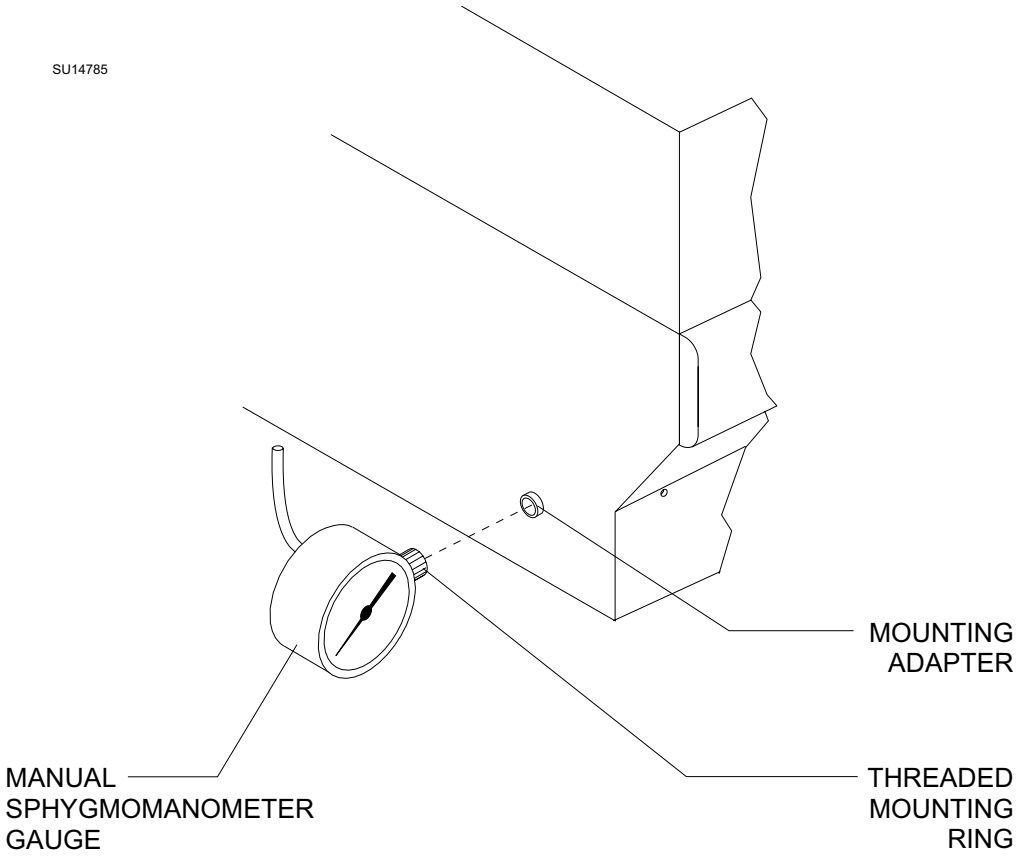
   a. Attach the threaded mounting adapter (P/N 4109347) to the underside of the boom arm mounting block with a ¼-20 x ¾ in. socket head cap screw (P/N HW01036).

   b. Install the gauge on the threaded fitting by tightening the gauge mounting ring in a clockwise direction.



Section 3
Setup and Installation

2. If the machine does not have a boom arm, install the gauge on the mounting adapter by tightening the gauge mounting ring in a clockwise direction.



3. Connect the gauge hose to the BP GAUGE fitting on the interface panel.

4. Connect the cuff extension hose to the BP CUFF fitting on the interface panel. Connect the other end of the cuff extension hose to a blood pressure cuff. Refer to the *Narkomed 2B Operator's Instruction Manual* for selecting the correct size blood pressure cuff.

5. Connect an inflation bulb to the female luer fitting labeled BP BULB on the front of the machine.

Installing the Second Shelf (Optional)

Refer to the instructions supplied with the second shelf.

Installing the Shelf Extender (Optional)

Refer to the instructions supplied with the shelf extender.

Installing the Auxiliary Lamp (Optional)

1. From the auxiliary lamp assembly, remove the two hex standoffs. (Each standoff is secured by an 8-32 x ¼ in. button head screw through the outside of the lamp housing.)

2. If the machine is not equipped with a shelf extender, thread the two hex standoffs into tapped holes on the ventilator box as shown in the illustration. Tighten each standoff and proceed to Step 3.

   If the machine is equipped with a shelf extender, the lamp housing is installed over the hex standoffs that were mounted during installation of the extender. Refer to the instructions supplied with the shelf extender.

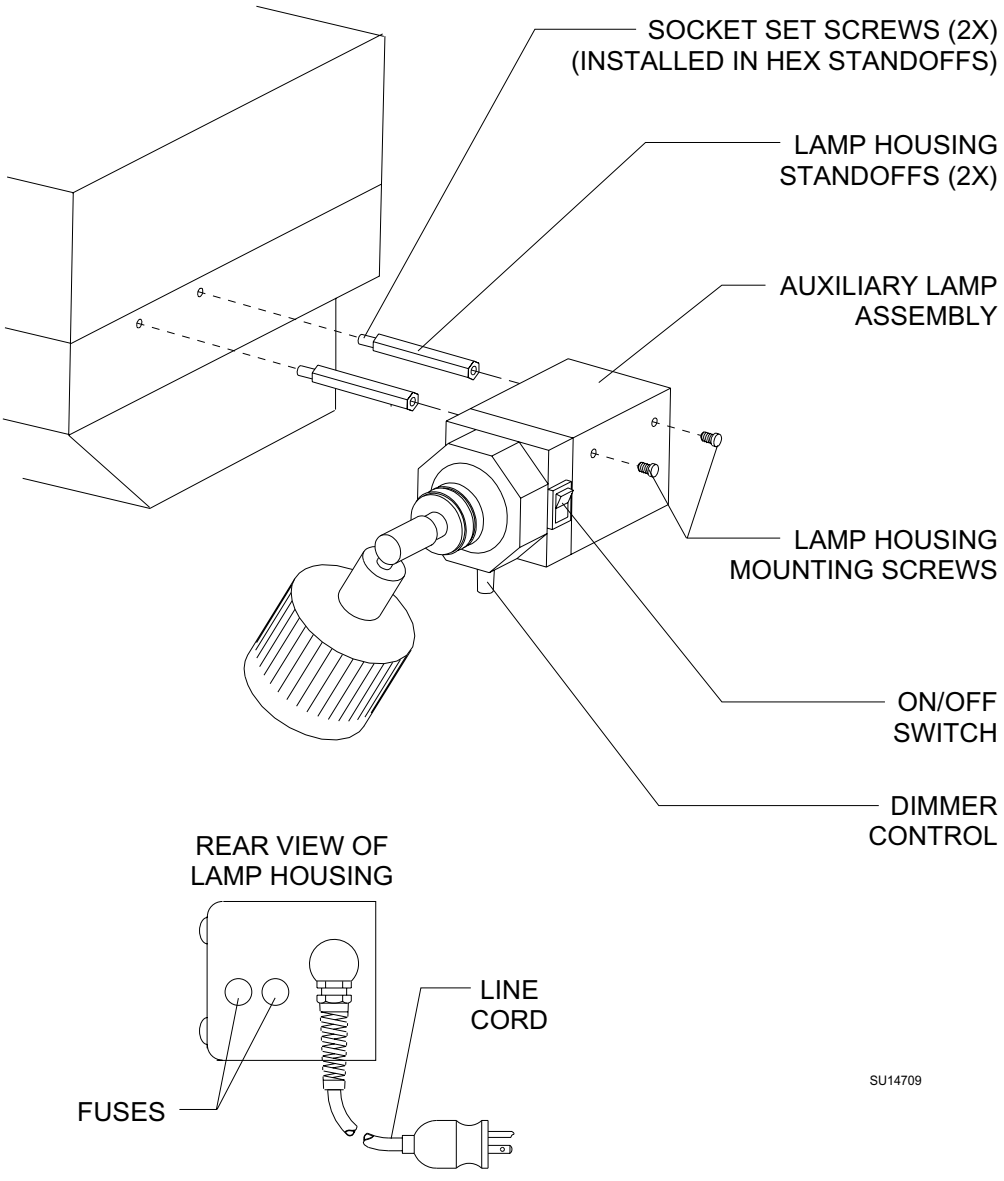
3. Install the auxiliary lamp housing over the standoffs, and secure the lamp housing to the machine with the two button head screws that were previously removed.

4. Verify that each fuse holder on the back of the lamp housing contains a 250V, 0.5A slow blow fuse (P/N 4112074-001).

5. Connect the auxiliary lamp line cord to one of the convenience outlets on the rear of the machine.

6. Verify that the lamp ON-OFF switch and dimmer control are working properly after the machine is connected to AC power.

Section 3
Setup and Installation

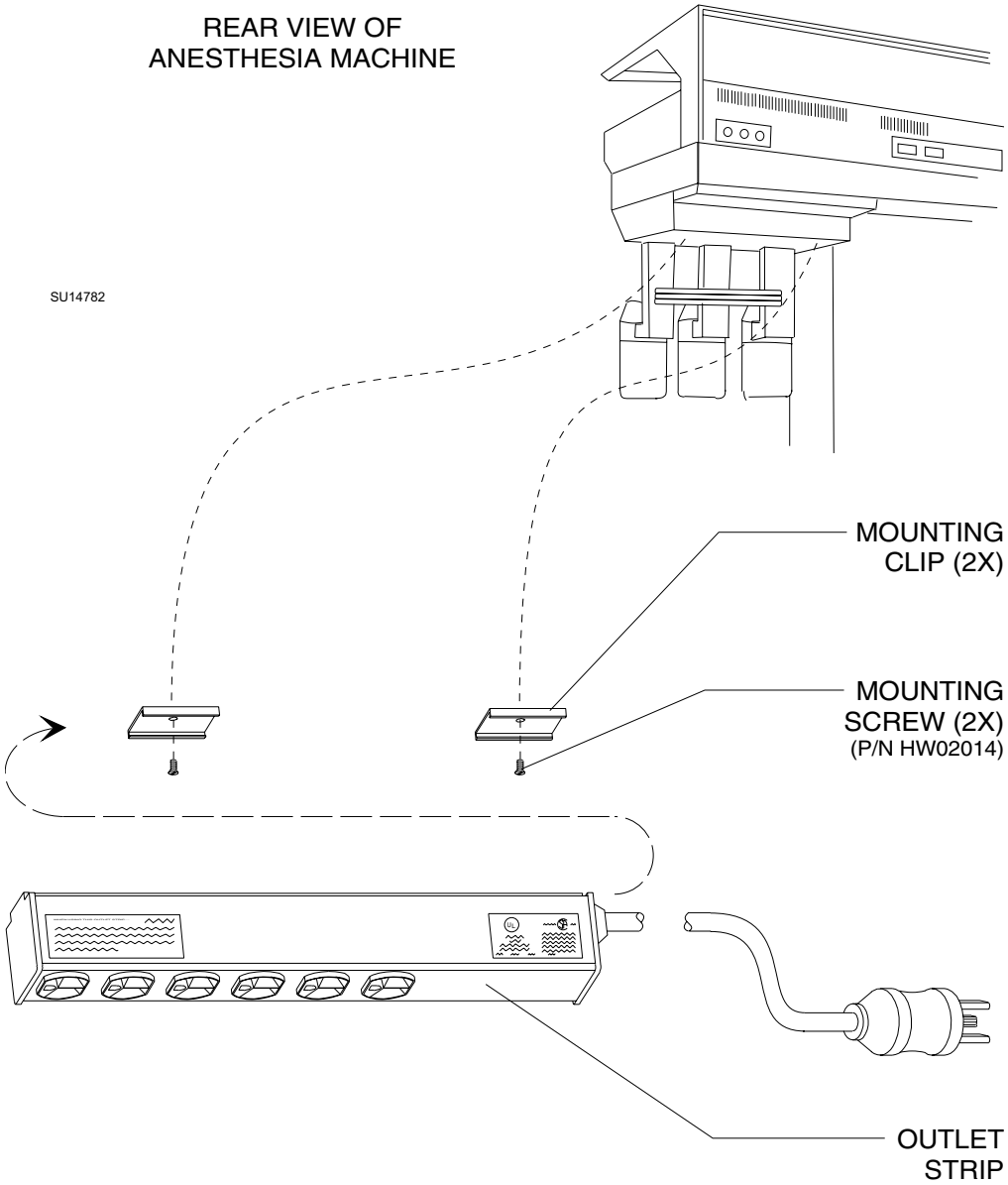


Installing the Outlet Strip (Optional)

1. Fasten the two outlet strip mounting clips to the vapor box bottom access plate with 8-32 x ¼ in. pan head screws.

2. Slide the outlet strip onto the mounting clips. Be sure that the clips engage both mounting rails on the outlet strip housing.

3. Connect the outlet strip power cord to a hospital grade outlet only. DO NOT connect the power cord to the convenience receptacles on the anesthesia machine.

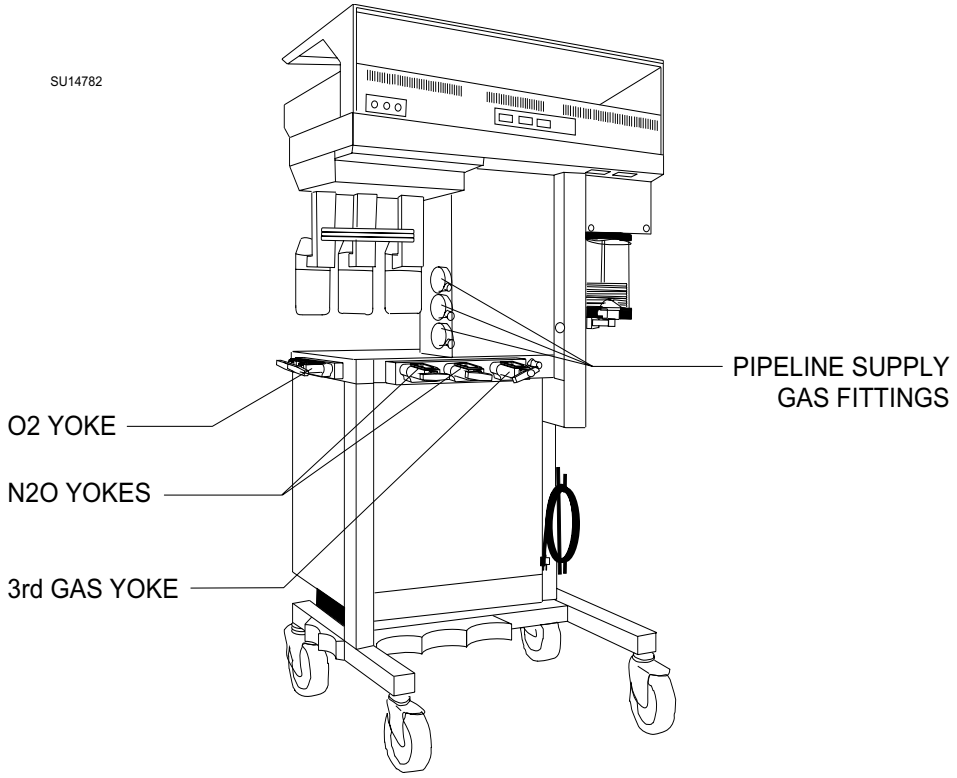


RETURN TO THIS MANUAL'S TABLE OF CONTENTS
RETURN TO CD-ROM TABLE OF CONTENTS

Section 4
Gas Supply Connections

Gas Supply Connections

The gas supply connections on the anesthesia machine are shown in the following illustration. Details of the cylinder yokes and pipeline connections are given in the following pages.



Color Coding

Each connection, valve, gauge, and flowmeter is labeled and color-coded for the appropriate gas. Color codes for the USA, ISO, and Germany are shown in the following table.

GAS SYSTEM COLOR CODING				
GAS	**MARKING**	**USA**	**ISO**	**Germany**
Air	AIR	Yellow	Black/White Checkered	Yellow
Carbon Dioxide	CO_2	Gray	Gray	Black
Nitrous Oxide	N_2O	Blue	Blue	Gray
Oxygen	O_2	Green	White	Blue
Oxygen-Helium	O_2-He	Brown/Green Diagonal Stripes	Brown/White Diagonal Stripes	N/A

Section 4
Gas Supply Connections

Connecting the Cylinders

The NARKOMED 2B is equipped with ANSI standard pin-indexed hanger yokes for E-size gas cylinders.

WARNING: Oil and grease may combine explosively with oxygen or nitrous oxide. For this reason, oil and grease must never come in contact with pipelines, cylinders, cylinder valves, gauges, fittings, etc., which conduct oxygen or nitrous oxide within the machine. For further information regarding safety precautions in the use of medical gases, consult Compressed Gas Association pamphlet P-2 and appropriate sections of National Fire Protection Association Standard 99.

Attach cylinders as follows:

1. Place a new washer on the seat of the yoke gas inlet connection.

WARNING: Use only one cylinder washer per yoke. Using more than one washer could cause leakage of the cylinder gas and compromise the pin indexing system.

2. Verify the presence and integrity of the two index pins below the gas inlet.

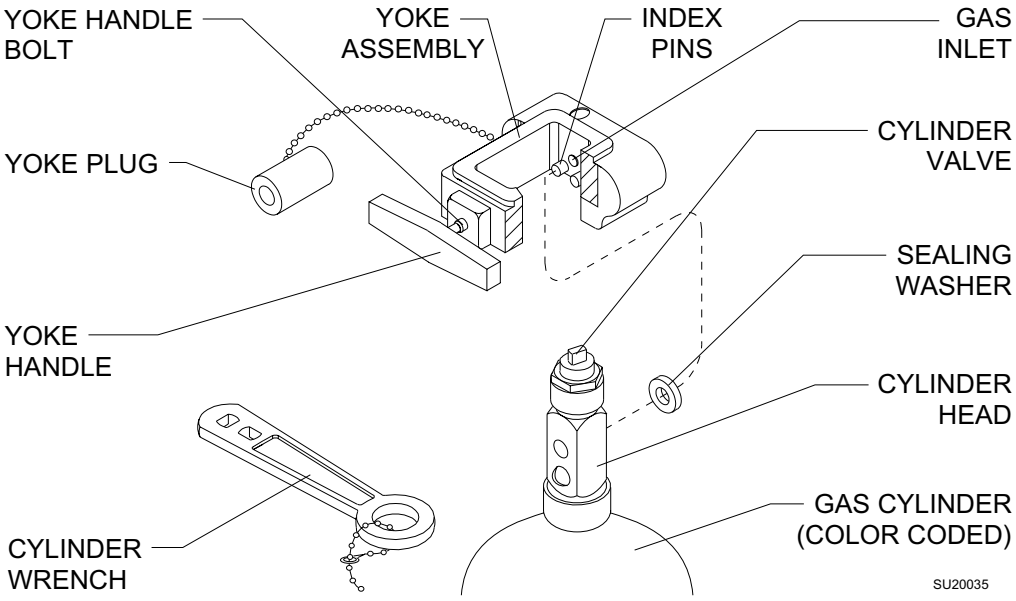
WARNING: Check cylinder yokes for the presence of two index pins each time a cylinder is attached to the machine.

3. Insert the head of a gas cylinder with matching gas into the yoke from below, so that the gas outlet and indexing holes on the cylinder head are facing the gas inlet and indexing pins on the yoke. (See the “Gas System Color Coding” table at the beginning of this section.)

4. Engage the indexing holes with the index pins. Screw the yoke handle clockwise against the cylinder head, so that the point of the yoke handle bolt is aligned with the countersunk recess on the back of the cylinder head.

5. Verify that the sealing washer is in place, that the index pins are engaged, and that the cylinder hangs vertically. Tighten the handle securely.

Section 4
Gas Supply Connections



Connecting the Pipelines

Pipeline connections for oxygen, nitrous oxide and an optional third gas are located on the side of the flowmeter housing. Several pipeline fitting styles are illustrated below. The pipeline inlets are marked with color-coded labels for each gas. (See the “Gas System Color Coding” table at the beginning of this section.)

WARNING: Oil and grease may combine explosively with oxygen or nitrous oxide. For this reason, oil and grease must never come in contact with pipelines, cylinders, cylinder valves, gauges, fittings, etc., which conduct oxygen or nitrous oxide within the machine. For further information regarding safety precautions in the use of medical gases, consult Compressed Gas Association pamphlet P-2 and appropriate sections of National Fire Protection Association Standard 99.

Section 4
Gas Supply Connections

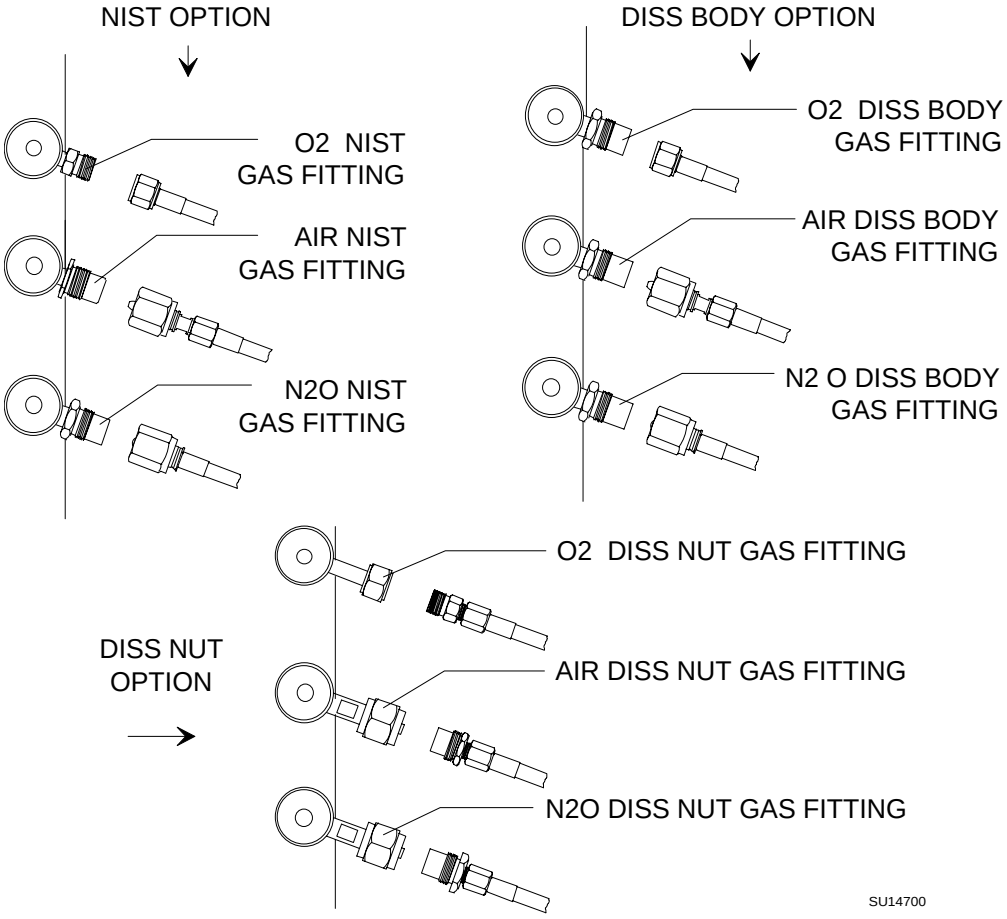
Connect the pipeline supply hoses as follows:

1. Verify that the hoses have the correct gas fittings. Connect the gas fitting on each supply hose to the corresponding gas fitting on the side of the flowmeter housing. Use a wrench to tighten the hex nut.

WARNING: Both ends of each gas supply hose must be indexed for the same gas. Pipeline delivery hoses used between wall outlets and anesthesia machines have caused accidents when, during assembly, an oxygen fitting has been placed on one end of the hose and a nitrous oxide fitting on the other end.

2. Connect the other end of each supply hose to the appropriate functioning hospital pipeline outlet.

3. Check the pipeline pressure gauge on the front of the NARKOMED 2B for sufficient pipeline pressure (50-55 psi).


NIST OPTION
O2 NIST GAS FITTING
AIR NIST GAS FITTING
N2O NIST GAS FITTING
DISS BODY OPTION
O2 DISS BODY GAS FITTING
AIR DISS BODY GAS FITTING
N2 O DISS BODY GAS FITTING
DISS NUT OPTION
O2 DISS NUT GAS FITTING
AIR DISS NUT GAS FITTING
N2O DISS NUT GAS FITTING
SU14700

Section 5
Electrical Connections and Power-Up

Connecting the NARKOMED 2B to Electrical Power

NARKOMED 2B machines wired for 117 VAC primary electrical power are equipped with a power cord and a hospital grade plug. Machines wired for 220 - 240 VAC primary electrical power are supplied without a cord connector; one must be installed on the cord by a qualified electrician.

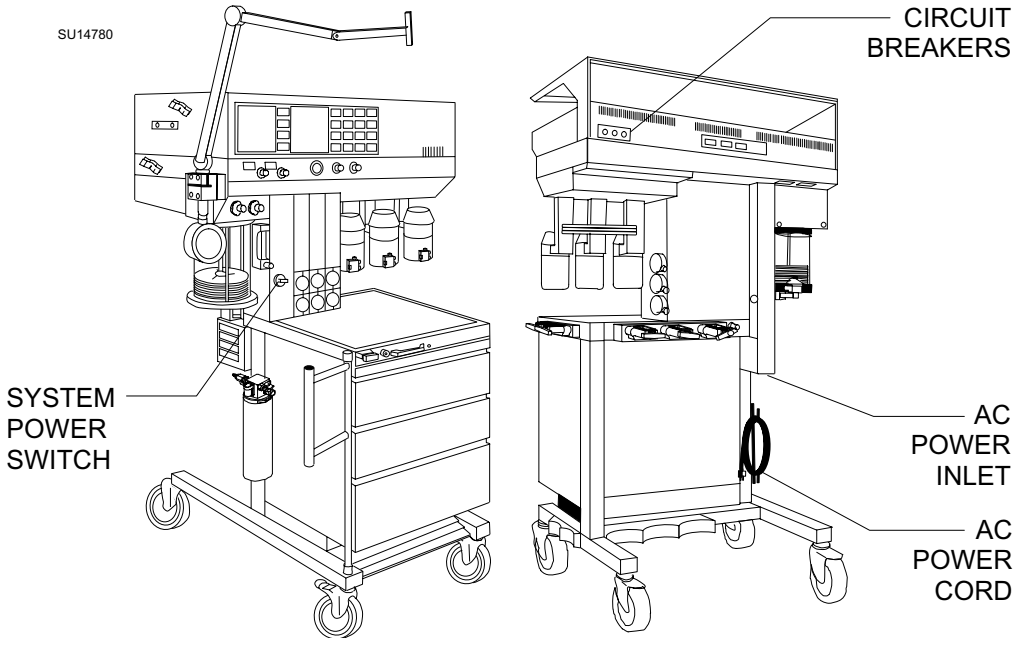
Connect the NARKOMED 2B to electrical power as follows:

1. Verify that the NARKOMED 2B's SYSTEM POWER switch is set to STANDBY.

2. Enable all circuit breakers by placing them in the "set" (pushed in) position.

3. Unwrap the power cord and connect its female end to the power inlet connector.

4. Plug the power cord into an active AC hospital grade outlet.



Section 5
Electrical Connections and Power-Up

Power-Up Diagnostics Test

1. Turn the NARKOMED 2B's SYSTEM POWER switch to ON. The self-diagnostic screen is displayed. A typical power-up diagnostic screen is shown in the illustration.

2. Verify that the battery-in-use (AC POWER FAIL) indicator on the main switch panel remains unlit.

3. Verify that all circuit breakers remain in the "set" (pushed in) position.

NARKOMED 2B

VIDEO TEST	PASS	VERSION x.xx DIAGNOSTICS
FIRMWARE TEST	PASS	COPYRIGHT, NAD INC.
MEMORY TEST	PASS	
TIMERS TEST	PASS	
ANALOG TEST	PASS	
AUDIO TEST - PRIMARY	PASS	
- BACKUP	PASS	
SERIAL I/O TEST	PASS	
CLOCK TEST	PASS	
BACKUP MEMORY TEST	PASS	
AC POWER TEST	PASS	
RESERVE POWER TEST	PASS	

FUNCTIONAL

6.0 PMC PROCEDURE, NARKOMED 2B

The procedures in this section shall be performed in their entirety each time a component is removed, replaced, calibrated, adjusted and during all scheduled Periodic Manufacturer's Certification (PMC) visits. A PMC Checklist form, P/N S010211 is available from Draeger Medical, Inc. and shall be completed by the Technical Service Representative each time a PMC is performed. Steps in the procedure marked with (✓) require a response at the corresponding line on the checklist form.

Space is also provided on the PMC checklist form to record the results of a vapor concentration test. Refer to the current Anesthesia Equipment & Monitoring System Service Information CD-ROM Service Procedures section for vapor concentration verification procedures.

NOTE: Test equipment listed below with an asterisk (*) requires calibration at a maximum interval of one year. Verify the dates on test equipment calibration labels. DO NOT USE any test equipment having an expired calibration date. Notify your supervisor immediately if any equipment is found to be out of calibration. In the space provided at the bottom of the PMC checklist form, record the Model and ID number of all calibrated test equipment used.

In the space provided at the bottom of the PMC checklist form, record the Model and ID number of all calibrated test equipment used. Also record the calibration due dates. Examples are: multimeter, digital pressure meter, Riken gas analyzer, safety analyzer, volumeter, trace gas analyzer, simulators.

Test Equipment Required:

-- *Electrical Safety Analyzer (Biotek 501 Pro or equivalent)
-- *Pressure Gauge with DISS Adapters (P/N 4114807 or equivalent)
-- *Flowmeter 0-250 ml min. (P/N S000081 or equivalent)
-- *Volume Meter (P/N 2212300 or equivalent)
-- *Digital Pressure Manometer (SenSym PDM 200CD or Equivalent)
-- *Riken Gas Indicator (Model 18H, or 1802D or equivalent)
-- Stop Watch
-- Test Lung (P/N 8401892)
-- AC Receptacle Circuit Tester

Materials Required:

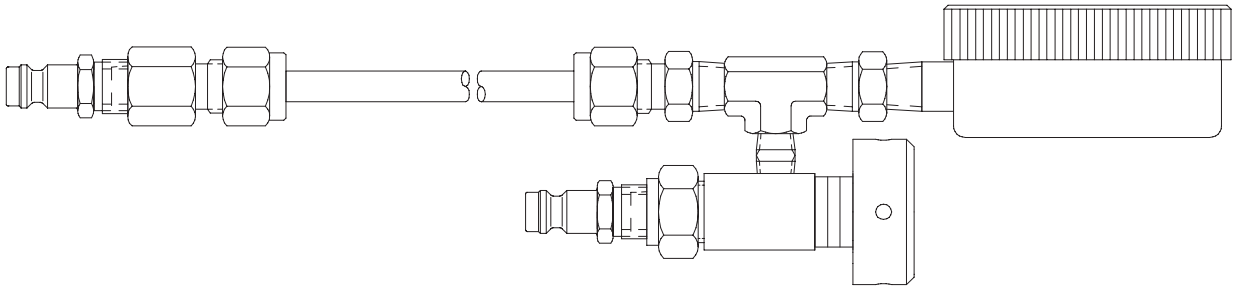
-- Spiromed Lubrication Kit (P/N 2218180)
-- Breathing Bag 3 liter (P/N 9995330 or equivalent)
-- Patient Circuit: Y-piece, elbow, 2x 32" x 22mm hoses
-- Hose 22 mm x 32" (P/N 9995132)
-- Fresh Gas Outlet Volume Test Device (P/N S010158 or equivalent)

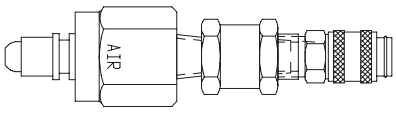
Materials Required (continued):

-- Fresh Gas Leak Test Adapter (P/N 4115041 or equivalent)
-- Volumeter/Fresh Gas Adapter (P/N 4115042)
-- Test Terminal 2x (P/N 4104389 or equivalent)
-- Breathing System Leak Test Device (P/N S010159 or equivalent)
-- PDM/Suction Adapter (P/N 4115038)
-- Scavenger Adapter (P/N 4108114)
-- NIBP w/Luer Test Adapter (P/N 4116111-001)
-- Pressure Monitor Test Adapter (P/N 4115043 or equivalent)

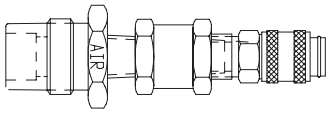
Key test equipment and materials illustrations are shown on following pages.

4114807 PRESSURE TEST ASSEMBLY , WITH ADAPTERS

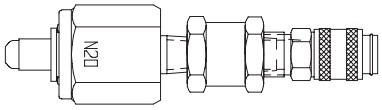




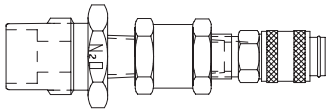
4114830-002



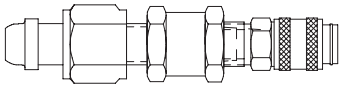
4114830-001



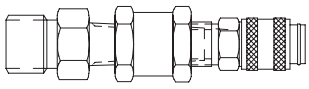
4114830-004



4114830-003



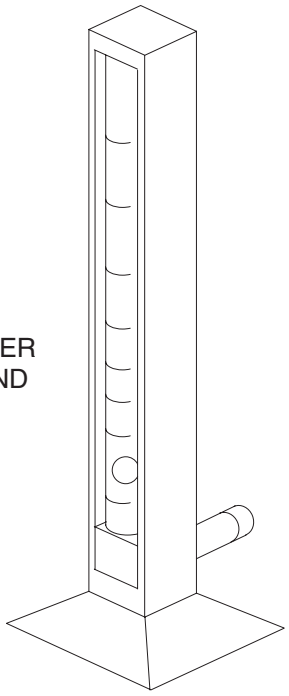
4114830-006

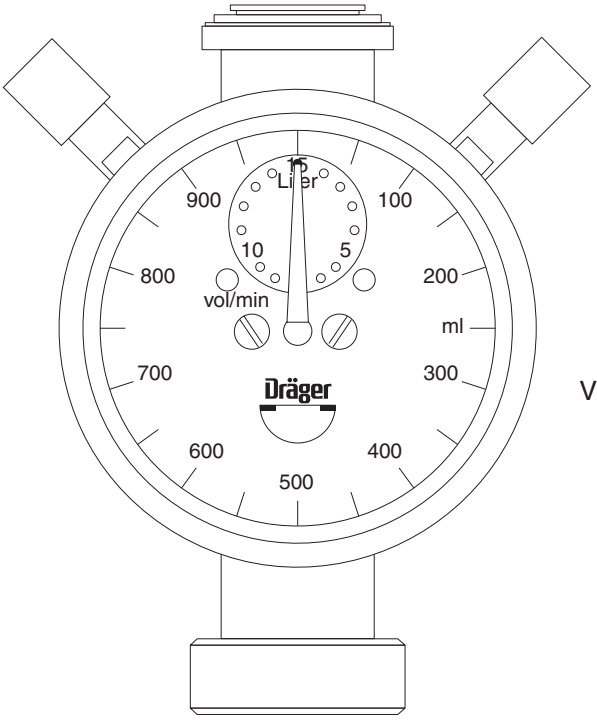


4114830-005

SP15001

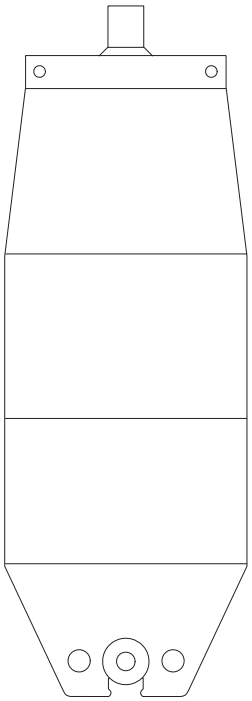
S000081
FLOW METER
TEST STAND



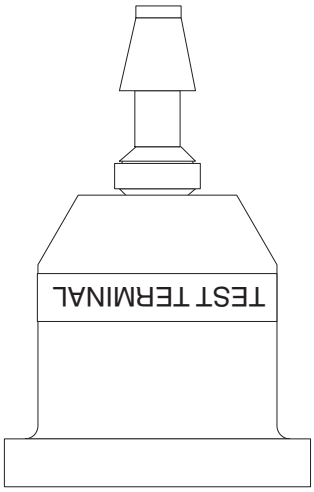


2212300
MINUTE
VOLUMETER

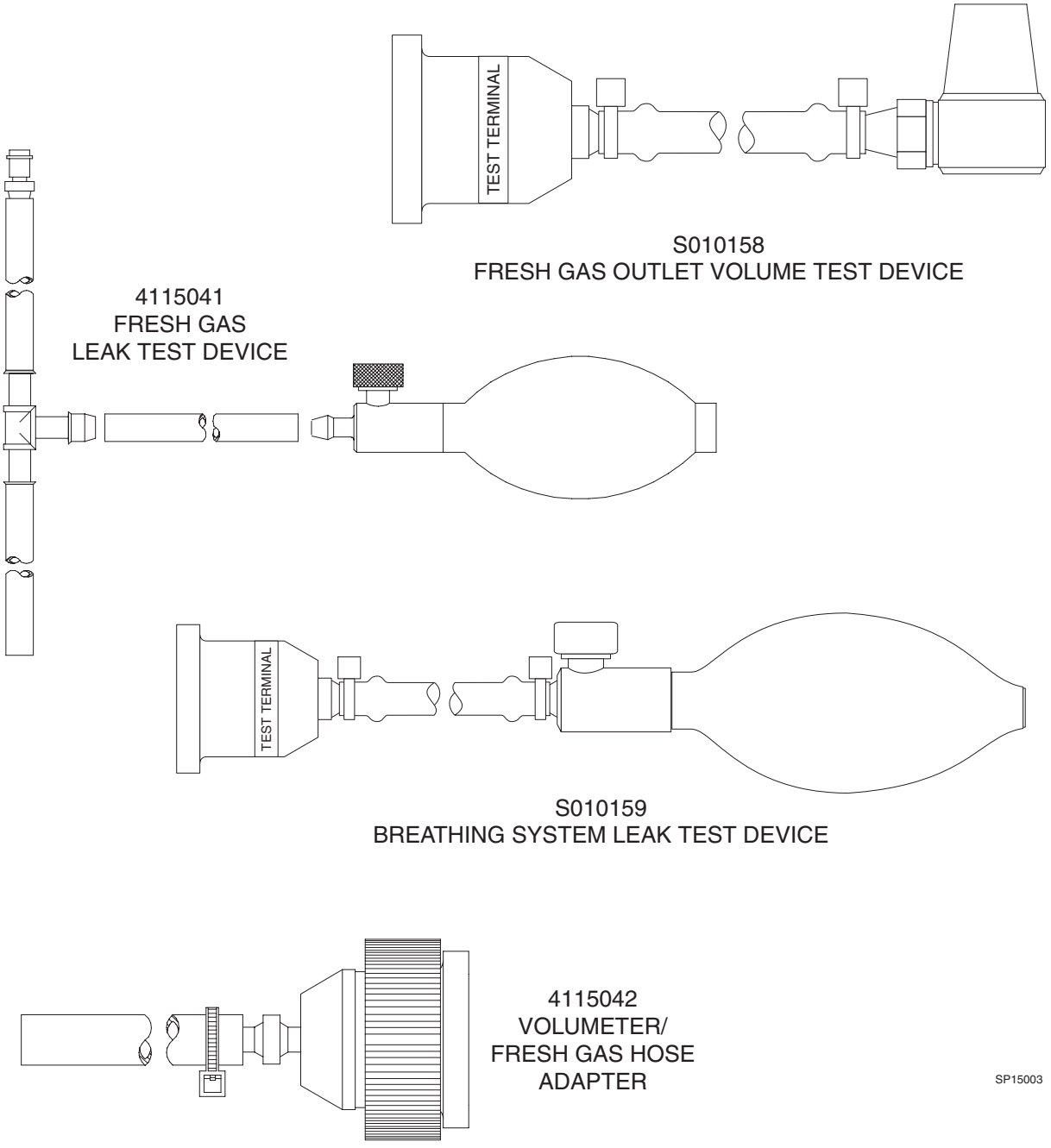
8401892
SIEMENS TEST LUNG

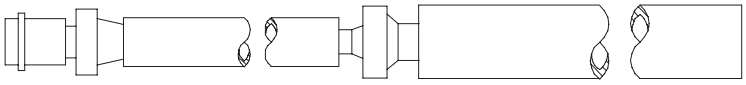


4104389
TEST TERMINAL
ADAPTER

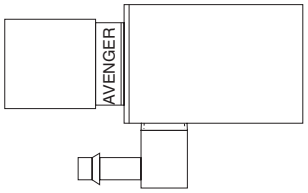


SP15002

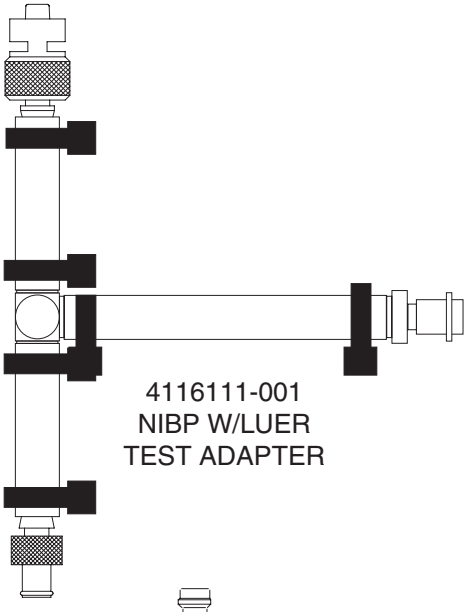

TEST TERMINAL
S010158
FRESH GAS OUTLET VOLUME TEST DEVICE
4115041
FRESH GAS
LEAK TEST DEVICE
TEST TERMINAL
S010159
BREATHING SYSTEM LEAK TEST DEVICE
4115042
VOLUMETER/
FRESH GAS HOSE
ADAPTER
SP15003



4115038
PDM TO PATIENT SUCTION ADAPTER



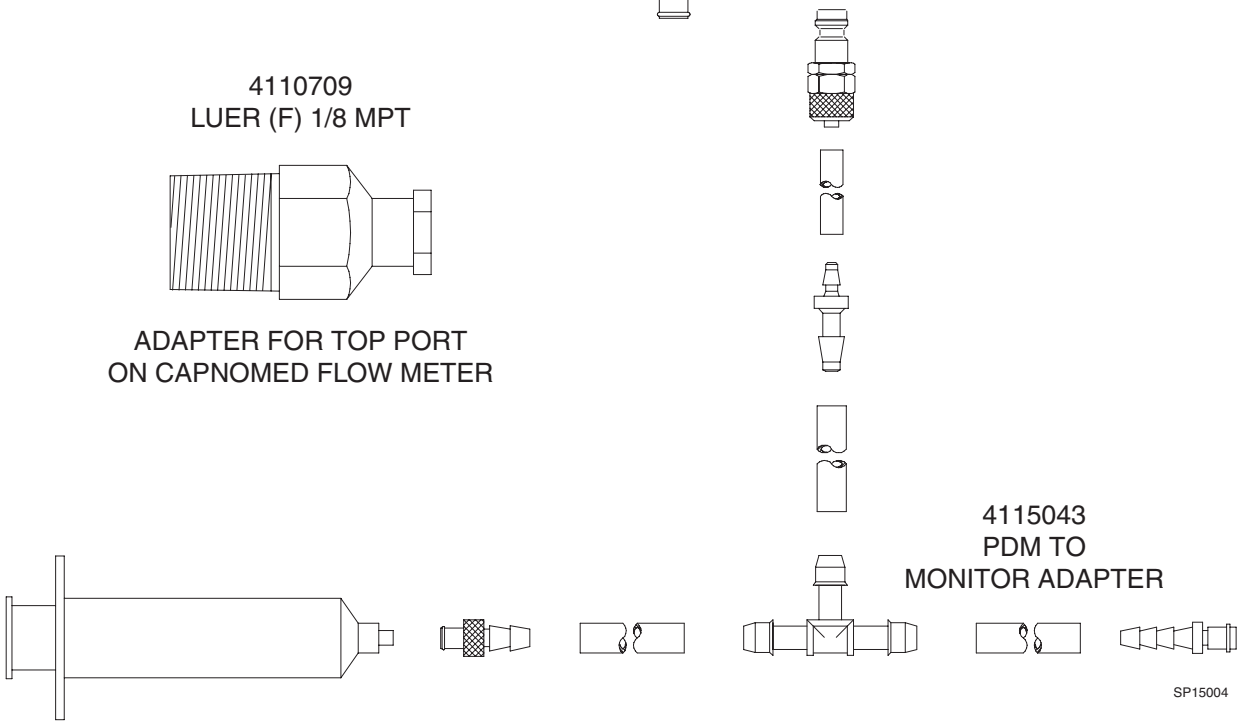
4108114
SCAVENGER ADAPTER



4116111-001
NIBP W/LUER
TEST ADAPTER

4110709
LUER (F) 1/8 MPT

ADAPTER FOR TOP PORT
ON CAPNOMED FLOW METER



4115043
PDM TO
MONITOR ADAPTER

SP15004

Periodic Manufacturer's Certification General Instructions

The purpose of this manual is to provide detailed instructions for performing a Periodic Manufacturer's Certification (PMC) inspection on a Narkomed 2B Anesthesia machine.

A PMC consists of a complete Periodic Manufacturer's Service procedure and a certification level inspection based on Draeger Medical, Inc. Recommendations and equipment performance. Additional inspections are also performed to insure proper product labeling.

Several additional documents have been created to ensure the success of this new program. Following is a brief description of the purpose of each document.

Field Service Procedure:

Periodic Manufacturer's Certification Forms - Part Number SP00175. This procedure illustrates sample checklists with typical periodic maintenance items filled in, including vapor concentrations verification tests, parts replaced, general comments and certification levels. Also included are sample PMC labels marked to show several levels of certifications. An excerpt from DMI's ***Anesthesia System Risk Analysis and Risk Reduction*** is included, and also a sample of an Executive Summary to be furnished to the hospital's Risk Manager or Chief of Anesthesia.

Field Service Procedure:

DMI Recommendations Guidelines Index Anesthesia Systems - Part Number S010250. This Guideline was created to provide an assessment of each machine's certification. It contains various comprehensive overviews of possible equipment conditions and their associated certification levels.

The first list in the Recommendation Guidelines is a reference chart for machine certification based on equipment status. The second is an abbreviated summary of all DMI Recommendations and Failure Codes including the Condition Number, Equipment Condition, Recommended Corrections, Certification Code, and Tests Affected when applicable.

There is also a matrix classified as "Failure Codes" which identifies the correct manner in which to document equipment tests that fail, or were unable to be performed due to circumstances beyond the control of the service technician performing the inspection. (Ex: Air cylinder supply is unavailable to perform Air High Pressure Leak test.) The Failure Codes section also indicates suggested resolution of the situation. Failure Code numbers begin at 34 and use the same certification levels strategy, and carry the same weight as DMI Recommendation equipment condition codes.

The final matrix is the most comprehensive index sorted by machine model and includes Equipment Condition, Certification Code, and DMI Recommendations. It also specifies any suggested upgrade path including ordering information that should be taken such as installing a Bellows with Pressure Limit Control 4109664-S01 Kit, after market modification kit to a machine not equipped with pressure limit control.

The letters A, B, C, D and the Roman Numerals I, II are used as codes in the individual matrix for each model of anesthesia machine. The letters A, B, C, and D are used in descending order to indicate the certification level of the equipment. They are as follows:

A = Certified

B = Certified with Recommendations

C = Conditionally Certified

D = No Certification

Roman Numerals I and II do not affect the certification level but rather are provided to give further instructions to the end user as follows:

I = The system in its present configuration shall only be used with a CO2 monitor incorporating an apnea warning. The operator of the system is advised to frequently scan the CO2 readings and alarm thresholds.

II =The present configuration of equipment requires that the unit operate at all times with an oxygen analyzer that includes a low oxygen warning. The operator of the system is advised to frequently scan the oxygen readings and alarm limits.

Following is an explanation of machine certification levels:

Certified- No DMI Recommendations or Failure Codes apply to machine being inspected. (Only item number 33 - "No Recommendations" shall apply for this certification level.)

Certified with Recommendations- A numbered DMI Recommendation or Failure Code with a code of B applies to the machine being examined.

Conditionally Certified- A numbered DMI Recommendation or Failure Code with a code of BCI or BCII applies to the machine being examined.

No Certification- A numbered DMI Recommendation or Failure Code with a code of D applies to the machine being examined.

When multiple recommendations apply, "No Certification" would take precedence over "Conditionally Certified" and "Certified with Recommendations". "Conditionally Certified" would take precedence over "Certified with Recommendations".

For example:

A **Narkomed 2B** could have DMI Recommendation number 21 and Failure Code 61.1 that apply. 21 - No ventilator pressure limit control. Code is B. 61.1 - Enflurane agent is unavailable to test. Code is BC. Correct certification for this machine is BC, which means CONDITIONALLY CERTIFIED WITH RECOMMENDATIONS.

A **Narkomed 4** could have DMI Recommendation numbers 14 and 21 apply.
14 - CO2/Agent monitor exhaust port is not properly connected to the waste gas scavenger. Code B. 21 - No ventilator pressure limit control. Code B.
The correct certification for this machine is B, which means "CERTIFIED WITH RECOMMENDATIONS".

A **Narkomed 2B, 2C or GS** could have DMI Recommendation 30 apply. 30 - Anesthesia machine is equipped with inhalation anesthesia vaporizers without an agent analyzer in the breathing system. Code B.
The correct certification for this machine is B, which means "CERTIFIED WITH RECOMMENDATIONS".

A **Narkomed 6000** could have no DMI Recommendations or Failure Codes apply. The correct certification level for this machine is Code A, "CERTIFIED". The correct certification for this machine is A, which means "CERTIFIED".

Code, D also means "NO CERTIFICATION", also means the machine shall not receive a Periodic Manufacturer's Certification label. The machine shall receive a "WARNING - This System Is Not Certified" label, P/N 4114857. This label shall be placed at a prominent location on the right side of the machine after all other previous PM and "Vigilance Audit(r) Validation" labels have been removed.

PM Certification Procedure for Narkomed 2B Anesthesia System

1. Use the PM Certification form for Narkomed 2B/ 2C/ GS Anesthesia Systems (P/N S010211).
2. Completely fill in the header information.
3. Determine if the ventilator has an MJV-2 square Clippard valve. If ventilator has an MJV-2, perform the lubrication procedure every 12 months in accordance with SP00062. Place a check mark and indicate the next lubrication due date in the “Vent Valve Lube Due” line on the Periodic Manufacturer’s Certification form. If the ventilator has a Humphrey valve (lubrication is not required), indicate so with a (H) next to the “Vent Valve Lube Due” line on the Periodic Manufacturer’s Certification form.
4. Replace the VENTILATOR RELIEF VALVE DIAPHRAGM every 12 months in accordance with SP00075. Place a check mark and indicate the next replacement date at “Relief Valve Diaphragm Due” line on the Periodic Manufacturer’s Certification form.
5. If machine is equipped with a HALOTHANE Dräger Vapor 19 or 19.1 vaporizer, determine if vaporizer must be inspected for soil condition one. Check the serial number plate located on the rear of the vaporizer for a plus (+) preceding the serial number. A HALOTHANE vaporizer serial number not preceded with a (+) must be tested for soil in accordance with SP00073. If vaporizer does not need to be inspected, indicate so with a plus (+) next to the “Vapor Inspection (H)” line on the Vigilance Audit form. If vaporizer is soil condition 0, indicate so with “SOIL 0” written next to the “Vapor Inspection (H)” line on the Vigilance Audit form. If vaporizer is soil condition one, indicate so with “SOIL 1” written next to the “Vapor Inspection (H)” line on the Vigilance Audit form. Place a “CAUTION DO NOT USE” label (part # 4114327) on the vaporizer, and issue a departmental alert. The TSR shall also seek permission from the equipment operator to remove the failed vaporizer from the machine and apply a replacement vaporizer or an adapter block onto the mount. All “SOIL 1” vaporizers must be removed from service for machine to receive certification.
6. Perform the vapor concentration test on all Dräger vapor vaporizers in accordance with SP00073 at a six month maximum interval. Perform the vaporizer concentration test on all Desflurane vaporizers in accordance with SP00091 for fixed mount vaporizers and SP00189 for user removable D-tec vaporizers at a six month maximum interval. For every vaporizer tested, fill out a “VAPOR VAPORIZER CALIBRATION CHECK” label (part # S010016). Information on this label shall include your signature, type of agent, date tested, a No Agent To Test or the test results @ 1%, 2.5%, 4% for H, E, I, or S vaporizers, or @ 4%, 10%, 12%, 16% for Desflurane vaporizers, and a PASS or FAIL indication. This label shall be attached to the upper right side of the vaporizer. If vaporizer fails the concentration verification, internal leak, or exclusion system tests, check “NO” in the “RECOMMENDED FOR USE” section on the PM Certification form. Place a “CAUTION DO NOT USE” label (part # 4114327) on the vaporizer, and issue a departmental alert. The TSR shall also seek permission from the customer to remove the failed vaporizer from the machine and install a replacement vaporizer or an adapter block onto the mount. All nonfunctional vaporizers must be removed from service for machine to receive certification.

7. Proceed with PM Certification procedure. If any tests fail refer to the “Failure Codes” listing in DMI Recommendations Guidelines Index (P/N S010250) to determine correct certification level starting point. Failure codes shall be documented on the “RECOMMENDATIONS / GENERAL COMMENTS” section of the PM Certification form and on the Executive Summary. If a test fails that has not been identified by the “Failure Codes” list, consult with Draeger Medical, Inc. to assess the proper certification level.

8. Based on the “EQUIPMENT CONDITION” inspect the machine for any “DMI RECOMMENDATIONS” that would apply. Use the Narkomed 2C section of the “RECOMMENDATION GUIDELINES INDEX” (P/N S010250). Note all applicable DMI recommendations on the Executive Summary.

NOTE: If using a carbon form, indicate the Equipment Condition number and to see reverse side under the “RECOMMENDATIONS / GENERAL COMMENTS” section of the form.

9. Determine the correct certification level of the machine based on the combined lowest common denominator of “Equipment Conditions” and “Failure Codes”. If the machine is at least conditionally certified fill out the “PM CERTIFICATION” label. Check the box(s) on the validation label where appropriate. Write the month and year, (three months from date of PM Certification) next to “NEXT VISIT DUE:”. If certification level is “D”, machine shall not receive a “PM CERTIFICATION” label. Any machine not receiving a PM Certification label shall receive a “WARNING NOT CERTIFIED” label, P/N **4114857**. This label shall be placed at a prominent location on the left side of the machine after all other previous PMC and Vigilance Audit Validation labels have been removed.

10. In the “CERTIFICATION LEVEL” section of the PM Certification form, record the last visit certification level, the current certification level and the next visit due month and year, (three months from date of PM Certification) in the spaces provided.

11. If applicable, remove the previous PM CERTIFICATION VALIDATION label and attach the new label (P/N S010006 w/phone #, or S010007 w/o phone #) in a prominent location on the rear of the anesthesia machine.

12. Check the appropriate boxes on the “PM CERTIFICATION NOTICE” label, (part # S010011). If the machine is not certified, the last box of this notice label shall be marked. Attach this notice near the flowmeter shield of the anesthesia machine.

13. Have the customer sign each PM Certification form or the Executive Summary, and review any Failure Codes equipment conditions and DMI Recommendations with the customer.

14. Return top copy to Draeger Medical, Inc. Service Department, keep middle copy for service organization records, give bottom copy to customer.

(✓) 6.1 SELF-DIAGNOSTICS

6.1.1 Turn the System Power switch to ON and verify the "ON" LED is lighted?

6.1.2 Verify all LED's on the keypad and ventilator displays are lit if applicable. Verify the flowmeter lights operate properly.

6.1.3 Verify that the following is displayed on the alarm CRT:

VIDEO TEST	**PASS**	**NARKOMED 2B**
FIRMWARE TEST	**PASS**	**VERSION x.xx DIAGNOSTICS**
MEMORY TEST	**PASS**	**COPYRIGHT, NAD INC. 1987-94**
TIMERS TEST	**PASS**	
ANALOG TEST	**PASS**	
AUDIO TEST - PRIMARY	**PASS**	
- BACKUP	**PASS**	
SERIAL I/O TEST	**PASS**	
CLOCK TEST	**PASS**	
BACKUP MEMORY TEST	**PASS**	
AC POWER TEST	**PASS**	
RESERVE POWER TEST	**PASS**	

FUNCTIONAL

(✓) 6.1.4 Record the machine software version on the header of the checklist form.

(✓) 6.2 ELECTRICAL SAFETY- One Year Service Interval; Due Date _____

(✓) 6.2.1 Ground Continuity

6.2.1.1 Unplug the AC power cord for all devices mounted to the machine that may provide an alternate path to earth ground, such as a Desflurane vaporizer.

6.2.1.2 Unplug the machine's AC power cord and plug the power cord of the safety analyzer into this AC receptacle.

NOTE: Do not plug the safety analyzer power cord into a line isolation monitor circuit, as inaccurate readings may occur.

NOTE: The BIOTECH 501 PRO will automatically test the source outlet for open ground (or ground resistance of 31 Ohms or higher), reverse polarity, open neutral and open line. (The latter two conditions will prevent the analyzer from powering up.)

6.2.1.3 Turn on the safety analyzer and set it's function switch to the GROUND WIRE RESISTANCE position. Attach the test lead to the red SINGLE LEAD connector of the analyzer. Connect the other end of the red test lead to the AC receptacle ground socket on the safety analyzer. Verify a displayed resistance of 0.00 ohms or, if necessary, press the CALIBRATE key on the front panel of the analyzer to zero the device.

6.2.1.4 Set the safety analyzer GROUND switch to NORMAL. Set the POLARITY switch to OFF.

6.2.1.5 Plug the machine's AC power cord into the safety analyzer.

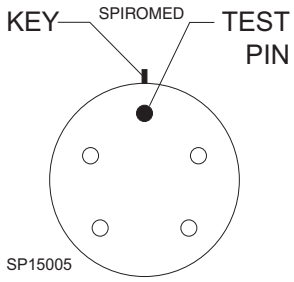
6.2.1.6 Apply the analyzer's test lead to a cylinder yoke bolt.

6.2.1.7 What is the value displayed on the safety analyzer? ___ ohm (0-0.1)

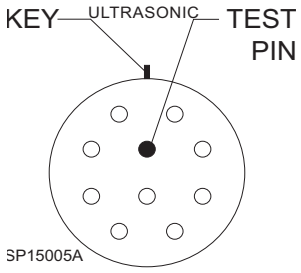
(✓) 6.2.2 Circuit Isolation

6.2.2.1 Disconnect the respiratory volume sensor cord from the interface panel.

6.2.2.2 Using a multimeter set to its highest resistance range apply the test leads between the yoke bolt and circuit common at the volume interface test pin. Refer to the corresponding illustrations for the proper test pin locations. There shall be no continuity between these points.



6.2.2.3 Reconnect the respiratory volume sensor cord to the interface panel.



6.2.3 Chassis Leakage Current

6.2.3.1 Apply the analyzer test lead to a cylinder yoke bolt.

6.2.3.2 Set the safety analyzer to the CHASSIS LEAKAGE CURRENT position.

(✓) 6.2.3.3 Record the total leakage current with the Polarity and Ground switches set as follows:

Ground	Polarity
Normal	Normal
Open	Normal
Open	Reversed
Normal	Reversed

6.2.3.4 Verify that the leakage current is 100* microamps or less in each of the switch positions (110 microamps or less for the 220/240 volt power supply option).

6.2.3.5 300 microamps if external monitors are plugged into convenience receptacles.

6.2.3.6 Shut off and unplug the safety analyzer. Remove the anesthesia machine plug from the analyzer and plug it back into the original AC receptacle.

(✓) 6.2.4 Convenience Receptacle and Auxiliary Outlet Strip

NOTE: This test will check the convenience receptacle and the auxiliary strip outlets for fault conditions such as open ground, reverse polarity, open line and open neutral.

6.2.4.1 Unplug all power cords from the convenience receptacles and auxiliary outlet strip.

6.2.4.2 Plug the Receptacle Tester into the first outlet to be tested. Verify no wiring fault is indicated then remove test plug and move it to the next convenience outlet. Repeat this process until all convenience outlets and auxiliary strip outlets are tested.

6.2.4.3 Plug-in all power cords previously removed from the convenience receptacles and auxiliary outlet strip.

(✓) 6.3 CONFIGURATION

6.3.1 Press the CONFIG key.

6.3.2 Verify the correct Time and Date is displayed.

6.4 SERVICE DATA

6.4.1 From the CONFIG screen, press and hold the 21% and APNEA ALARM DISABLE keys, then press the CONFIG key (while still holding the previous two keys). The alarm CRT should display the Service Menu screen.

6.4.2 Press the DIAGNOSTICS key.

6.4.3 Remedy any Error Log codes. Contact the Draeger Medical, Inc. Technical Service Department if necessary.

6.4.4 Press the RESET DATE key.

6.4.5 Press the KEY TEST key twice.

6.4.6 The alarm CRT should display the outline of all keys on the display panel.

6.4.7 Press each key on the display panel, one at a time.

6.4.8 This step intentionally left blank.

6.4.9 As each key on the display panel is pressed, do all the corresponding keys on the alarm CRT illuminate? ___(Y)

NOTE: The TREND key should be pressed last, because it also exits the Key Panel Test Screen.

6.4.10 This step intentionally left blank.

6.4.11 Press the TREND key to exit the DIAGNOSTIC menu.

6.4.12 Press the exit key to exit the main service screen, If not performing monitor calibrations press the exit key again to return to normal operation mode.

(✓) 6.5 CALIBRATIONS - One Year Service Interval; Due Date _____

6.5.1 Press the CALIBRATIONS key on the Service Menu to bring up the Calibrations menu.

6.5.2 Remove the Oxygen sensor from the valve dome adapter, and remove the Oxygen sensor capsule from the Oxygen sensor housing.

(✓) 6.5.3 When the "OFFSET O_2 CELL A" and "OFFSET O_2 CELL B" readings (displayed in left column) Have stabilized and are as close as possible to each other with a difference not greater than 8, press the O_2 MED key and verify that the new offset values are stored.

NOTE: The higher the offset, the higher the calculated O_2 concentration appears at high concentrations.

6.5.4 Put the Oxygen sensor capsule into the Oxygen sensor housing.

6.5.5 Disconnect the breathing pressure monitor's sensor line from the absorber.

6.5.6 Connect a pressure monitor adapter, (P/N 4115043) and calibrated digital pressure manometer to the breathing pressure sensor line.

6.5.7 Pressurize the circuit to 60 cm H_2O and allow the Current Value to stabilize. Reading should be between 465 and 519.

6.5.8 This step intentionally left blank.

6.5.9 This step intentionally left blank.

(✓) 6.5.10 Press the BAROMED key and verify the following message: "PRESSURE READINGS STORED".

6.5.11 Release the pressure, disconnect the manometer and test fixture, and reconnect the breathing pressure sensor line to the absorber.

6.5.12 Press the EXIT key to exit the Calibration Screen.

6.5.13 Press the EXIT key to Set the cursor to EXIT and press the trigger to return to normal operation.

(✓) 6.6 ABSORBER MAINTENANCE

6.6.1 Remove the O_2 sensor or the plug from the inspiratory valve dome adapter and examine the O-rings on each assembly. Replace O-rings as necessary.

6.6.2 Remove the inspiratory and the expiratory valve domes.

6.6.3 Are all pins on the valve crater undamaged? Inspiratory ___ (Y) Expiratory ___ (Y)

6.6.4 Are all pins on the valve domes undamaged? Inspiratory ___ (Y) Expiratory ___ (Y)

6.6.5 Is the valve disc in good condition? Inspiratory ___ (Y) Expiratory ___ (Y)

6.6.6 Are the valve dome washers in good condition? ___ (Y)

6.6.7 Reinstall the inspiratory and expiratory valve domes.

6.6.8 Ultrasonic Flow Sensor - If applicable

6.6.8.1 Remove the Ultrasonic Flow Sensor connector hose.

6.6.8.2 Is the connector hose, connector, and O-ring in good condition? ___ (Y)

6.6.8.3 Remove the expiratory valve.

6.6.8.4 Is the washer under the valve in good condition? ___ (Y)

6.6.8.5 Reattach the expiratory valve.

6.6.8.6 Remove the ultrasonic flow sensor from the mounting bracket.

6.6.8.7 Remove the flow housing/transducer assembly from the electronics housing.

6.6.8.8 Remove both transducers from the flow housing; examine each O-ring and condition of all components, then reassemble the ultrasonic flow sensor.

6.6.8.9 Reattach the ultrasonic flow sensor to the mounting bracket.

6.6.8.10 Reattach the connector hose between the sensor and expiratory valve.

6.6.9. Lubrication, Spiromed Sensor - If applicable

6.6.9.1 Remove the expiratory valve.

6.6.9.2 Is the washer under the valve in good condition? ___ (Y)

6.6.9.3 Remove the Spiromed sensor.

6.6.9.4 Is the washer under the sensor in good condition? ___ (Y)

6.6.9.5 Locate the four lateral holes at the sides of the Spiromed sensor marked by arrows.

CAUTION: Use only Sensor Lubrication Kit P/N 2218180 for the following procedure.

6.6.9.6 Dip the tip of the pipette into the lubricant and draw lubricant into the pipette by pulling the pin backwards.

6.6.9.7 Insert the pipette into one of the four holes as far as it will go. Push the pin forward to its stop and inject lubricant into the hole.

6.6.9.8 Repeat the previous 2 steps for the lubricating three remaining holes.

6.6.9.9 Wipe any lubricant residue from the exterior of the sensor.

6.6.9.10 Reattach the sensor to the absorber top dome.

6.6.9.11 Reattach the expiratory valve to spiromed sensor.

6.6.10. Remove the inspiratory valve assembly.

6.6.11. Is the washer under the valve in good condition? ___ (Y)

6.6.12 Reinstall the inspiratory valve.

6.6.13 Are there two (2) spring clips on the absorber rods? ___ (Y)

6.6.14 Inspect the following: canisters, canister gaskets, dust cup and O-ring, and soda lime.

6.6.15 Are the canisters, canister gaskets, dust cup and O-ring, and soda lime in good condition? ___ (Y)

6.6.16 Verify the cm H_2O gauge at zero (0) and readjust if necessary.

NOTE: The small slotted screw is the zero adjust.

6.6.17 Reinstall the O_2 sensor plug into the inspiratory valve dome adapter.

6.6.18 Remove the 15-mm connector from the FRESHGAS OUTLET.

6.6.19 Is the Freshgas Outlet assembly in good condition? ___ (Y)

6.6.20 Reconnect the 15-mm connector to the FRESHGAS OUTLET.

6.6.21 Repack MAN/AUTO Selector Valve, If applicable

6.6.21.1 Remove the four screws securing the stick shift block to the selector valve body and remove the block.

6.6.21.2 Remove the spring and valve channel from the valve body.

6.6.21.3 Remove all residual lubricant from the valve channel.

6.6.21.4 Remove all residual lubricant from the valve body.

6.6.21.5 Apply a minimal amount of “stop cock” lubricant (Dow Corning High Vacuum Grease, P/N S4105908) to the tapered surface of the valve channel, and ensure complete coverage of lubricant.

6.6.21.6 Insert the valve channel into the valve body.

6.6.21.7 Insert the spring into the stick shift block.

6.6.21.8 Align the index pins on the stick shift block to the holes in the valve channel.

6.6.21.9 Secure the stick shift block to the selector valve body with the four screws that were previously removed.

6.6.21.10 Operate the selector valve handle and verify smooth movement.

(✓) 6.7 HIGH PRESSURE LEAK

NOTE: Minimum cylinder pressures required for High Pressure Leak tests are: O_2, Air, O_2-HE, N2, HE: 1000 psi \ N_2O, CO_2: 600 psi;

6.7.1 Turn the machine main switch to Standby.

6.7.2 Verify the Auxiliary Oxygen flow control valve is closed.

6.7.3 Disconnect all pipeline supply hoses at the wall outlets.

6.7.4 Open then close and remove each cylinder and if applicable remove the yoke plug from each additional yoke assembly.

6.7.5 Note the reading on each the cylinder pressure gauge and start a stop watch.

6.7.6 Are the two (2) yoke index pins installed securely in each yoke? ___(Y)

6.7.7 Is the proper gas I.D. label affixed to each yoke? ___ (Y)

6.7.8 After two (2) minutes, is the pressure loss for each gas equal or less than 50 psi? ___(Y)

6.7.9 Verify the presence of only one (1) cylinder washer, then reattach and secure the cylinders to each yoke assembly, then open each cylinder valve.

6.8 BREATHING SYSTEM

6.8.1 Breathing System Leak/Exclusion

6.8.1.1 Close all flow control valves.

6.8.1.2 Set the AUTO/MAN selector to BAG.

6.8.1.3 Close the APL valve.

6.8.1.4 Interconnect a 22 mm hose (P/N 9995132) between the inspiratory valve and expiratory valve or expiratory port on the ultrasonic flow sensor, if applicable.

6.8.1.5 Attach a test terminal (P/N 4104389) to the Fresh Gas Leak Test Adapter (P/N 4115041) then attach the test terminal to the bag mount.

6.8.1.6 Apply 50 cm H_2O test pressure to the absorber system and start a stop watch.

6.8.1.7 Is the pressure on the absorber pressure gauge within 47 to 53 cm H_2O? ___(Y)

(✓) 6.8.1.8 After thirty (30) seconds, is the breathing system test pressure equal or greater than 40 cm H_2O? ___ (Y)

6.8.1.9 If applicable, turn on the left mounted vaporizer to the first graduated marking. Reapply 50 cm H_2O of pressure to the system and start a stopwatch. Is it possible to turn on either the center or right vapors? ___ (N)

(✓) 6.8.1.10 After thirty (30) seconds, is the left vaporizer test pressure equal or greater than 40 cm H_2O? ___(Y) Turn off the left vaporizer.

6.8.1.11 If applicable, turn on the center mounted vaporizer to the first graduated marking. Reapply 50 cm H_2O of pressure to the system and start a stopwatch. Is it possible to turn on either the left or right vapors? ___ (N)

(✓) 6.8.1.12 After thirty (30) seconds, is the center vaporizer test pressure equal or greater than 40 cm H_2O? ___(Y) Turn off the center mounted vaporizer.

6.8.1.13 If applicable, turn on the right mounted vaporizer to the first graduated marking. Reapply 50 cm H_2O of pressure to the system and start a stopwatch. Is it possible to turn on either the left or center vapors? ___ (N)

(✓) 6.8.1.14 After thirty (30) seconds, is the right vaporizer test pressure equal or greater than 40 cm H_2O? ___ (Y) Turn off the right mounted vaporizer.

(✓) 6.8.1.15 Did all vaporizer exclusion verifications test positive? ___ (Y)

6.8.2 APL Valve

6.8.2.1 Open the APL valve to its stop.

6.8.2.2 Turn the System Power switch to ON.

6.8.2.3 Set the Oxygen flow to 8 l/min.

(✓) 6.8.2.4 Is the pressure within 0 to 3 cm H_2O? ___ (Y)

6.8.3 O_2 Flush

6.8.3.1 Attach a 33 mm x 22 Female Adapter (P/N 4115087) to the top port of the test volumeter.

6.8.3.2 Disconnect the hose from the expiratory valve or expiratory hose terminal on the ultrasonic flow sensor, if applicable and attach it to the test volumeter adapter.

6.8.3.3 Close the APL valve.

6.8.3.4 Press and hold the O_2 FLUSH button for 6 seconds; multiply the value obtained by 10.

(✓) 6.8.3.5 Is the calculated O_2 flush flow rate 45 to 65 l/min.? ___ (Y)

6.8.3.6 After releasing the flush, does the flow of Oxygen stop immediately? __ (Y)

6.8.3.7 Remove the test equipment.

6.8.4 Expiratory Valve Leak

6.8.4.1 Connect a 22 mm hose (P/N 9995132) between the inspiration valve and the bag mount.

6.8.4.2 Connect a test terminal (P/N 4104389) to the expiration valve or expiratory hose terminal on the ultrasonic flow sensor, if applicable.

6.8.4.3 Connect a 0-250 ml/min. flowmeter (S000081) to the test terminal.

6.8.4.4 Turn up the Oxygen flow until the system pressurizes to 30 cm H_2O. Adjust the APL valve as necessary to maintain 30 cm H_2O.

(✓) 6.8.4.5 Is the value indicated on the flowmeter within 0 to 60 ml/min.? ___ (Y)

6.8.4.6 Close APL valve.

6.8.4.7 Remove all test equipment.

6.8.5 Inspiration Valve Leak

6.8.5.1 Turn the System Power switch to Standby.

6.8.5.2 Connect a test terminal (P/N 4104389) to the inspiratory valve.

6.8.5.3 Connect a Fresh Gas Leak Adapter (P/N 4115041) and calibrated pressure meter to the test terminal on the inspiratory valve.

6.8.5.4 Connect another test terminal to the bag connector.

6.8.5.5 Connect a 0-250 ml/min. flowmeter (S000081) to the test terminal on the bag mount.

6.8.5.6 Pressurize the test circuit to 30 cm H_2O.

(✓) 6.8.5.7 Is the value indicated on the flowmeter within 0 to 60 ml/min.? ___ (Y)

6.8.5.8 Turn the system power switch to ON.

6.8.5.9 Remove all test equipment.

6.8.6 PEEP Valve w/Bypass - If applicable

6.8.6.1 Open the APL valve. If PEEP valve is mounted on the bellows, set the AUTO/BAG valve to AUTO.

6.8.6.2 Interconnect the inspiratory valve and expiratory valve or expiratory port on the ultrasonic flow sensor, if applicable with a 22 mm hose (P/N 9995132).

6.8.6.3 Attach a Breathing System Leak Test Adapter (P/N S010159) to the bag mount.

6.8.6.4 Disconnect the pressure pilot line from the absorber and replace it with a PDM To Monitor Adapter (P/N 4115041).

6.8.6.5 Connect a test gauge to the adapter.

6.8.6.6 Set the O_2 flow to 5 l/min.

6.8.6.7 * Place the PEEP bypass in the ON position.

6.8.6.8 Adjust the absorber PEEP valve clockwise to the maximum position.

6.8.6.9 Does the PEEP valve adjust smoothly? ___ (Y)

(✓) 6.8.6.10 Is the maximum PEEP indicated on the test gauge within 15 to 22 cm H_2O? ___ (Y)

6.8.6.11 * Place the PEEP bypass in the OFF position.

6.8.6.12 * Does the PEEP return to ≤ 3 cm H_2O? ___(Y)

6.8.6.13 Adjust the absorber PEEP valve counterclockwise to its minimum position.

6.8.6.14 Does the PEEP return to ≤ 3 cm H_2O? ___(Y)

6.8.6.15 Close the O_2 flow control valve.

6.8.6.16 Remove the test equipment and reconnect the pilot line to the absorber.

6.8.6.17 If PEEP valve is mounted on the bellows return the AUTO/BAG valve to BAG.

* These items apply only to machines with a PEEP by-pass.

6.8.7 Bain Circuit Adapter - If applicable

6.8.7.1 Close the Bain Circuit APL valve by turning the knob fully clockwise.

6.8.7.2 Verify the cm H_2O gauge at zero (0) and readjust if necessary.

NOTE: The small slotted screw is the zero adjust.

6.8.7.3 Insert the O_2 sensor plug into the O_2 sensor inlet on the Bain Circuit.

6.8.7.4 Attach a Breathing System Leak Device (P/N S010159) to the Breathing Bag port on the Bain Circuit.

6.8.7.5 Disconnect the pressure pilot line from the Bain Circuit and replace it with a PDM To Monitor Adapter (P/N 4115041).

6.8.7.6 Connect a test gauge to the adapter.

6.8.7.7 Occlude the expiration port on the Bain Circuit.

6.8.7.8 Apply 50cm H_2O test pressure to the Bain Circuit.

6.8.7.9 Is the pressure indicated on the cm H_2O gauge within 3 cm H_2O of the digital pressure meter reading? ___ (Y)

(✓) 6.8.7.10 After 30 seconds, is the test pressure 45 to 50 cm H_2O? ___ (Y)

6.8.7.11 Open the APL valve by turning the knob fully counter-clockwise.

6.8.7.12 Connect a Fresh Gas Outlet Volume Adapter (P/N S010158) between the fresh gas outlet and the Expiration port of the Bain Circuit.

6.8.7.13 Set the O_2 flow to 8 l/min.

(✓) 6.8.7.14 Is the test pressure within 0 to 3 cm H_2O? ___ (Y)

6.8.7.15 Remove the test equipment and reconnect the pilot line to the Bain Circuit.

6.9 OXYGEN ANALYZER

6.9.1 Press the O_2 CAL key to perform an 02 Calibration.

NOTE: Make sure that the sensor has stabilized in ambient air for several minutes.

(✓) 6.9.2 After calibration is completed, is the O_2 concentration 21 %? ___(Y)

6.9.3 The warning message % OXYGEN LOW shall appear on the central alarm display, and a continuous alarm shall sound.

6.9.4 Press the Alarm Silence key and verify the audio alarm is silenced.

6.9.5 Place the Oxygen sensor into the inspiratory valve dome adapter.

6.9.6 Set the AUTO/MAN selector to BAG.

6.9.7 Close the APL valve.

6.9.8 Attach a 22 mm hose (P/N 9995132) to the inspiratory valve.

6.9.9 Attach a Breathing System Leak Test Device (P/N S010159) to the bag mount.

6.9.10 Press the O_2 Flush.

6.9.11 After 10 seconds, is the O_2 concentration 90 to 100 % O_2? ___ (Y)

6.9.12 Release the O_2 Flush, does the flow cease immediately? ___ (Y)

6.9.13 Set the Oxygen flow to 10 l/min.

(✓) 6.9.14 After 1 minute, is the O_2 concentration 97 to 100%? ___ (Y)

6.10 FLOWMETERS/GAS CONCENTRATIONS

(✓) 6.10.1 Oxygen Flowmeter

6.10.1.1 Is it possible to adjust the flow of Oxygen over the full range of the flowmeters? ___ (Y)

6.10.1.2 Set the Oxygen flow to 4 l/min.

6.10.1.3 Is the correct flow control knob and label attached to the Oxygen flow control valve? ___ (Y)

(✓) 6.10.2 Oxygen-Helium Flowmeter - If applicable

6.10.2.1 Set the gas selector to ALL GAS, if applicable. Is it possible to adjust the flow of the Oxygen-Helium over the full range of the flowmeter? ___ (Y)

6.10.2.2 Set the Oxygen-Helium flow to 2 l/min.

6.10.2.3 *After the value stabilizes, is the O_2 concentration 72 to 78% O_2? ___ (Y)

6.10.2.4 Close the Oxygen-Helium flow valve.

6.10.2.5 Is the correct flow control knob and label attached to the Oxygen-Helium flow control valve? ___ (Y)

*Oxygen-Helium specifications are given @ 25% O_2. Cylinder content deviations will affect this value. The expected concentration values can be obtained by replacing the '25' % O_2 value given for O_2-HE with the actual cylinder content as follows:

$$\frac{(2 \text{ l/min } O_2\text{-HE} \times \text{'25'}) + (4 \text{ l/min. } O_2 \times 100)}{6 \text{ l/min - Total Flow}} = \%\ O_2$$

(✓) 6.10.3 Helium Flowmeter - If applicable

6.10.3.1 Set the gas selector to ALL GAS, if applicable.

6.10.3.2 Is it possible to adjust the flow of the Helium over the full range of the flowmeter? ___ (Y)

6.10.3.3 Set the Helium flow to 2 l/min.

6.10.3.4 After the value stabilizes, is the O_2 concentration 64 to 70? ___ (Y)

6.10.3.5 Close the Helium flow valve.

6.10.3.6 Is the correct flow control knob and label attached to the Helium flow control valve? ___(Y)

(✓) 6.10.4 Nitrogen Flowmeter - If applicable

6.10.4.1 Set the gas selector to ALL GAS, if applicable.

6.10.4.2 Is it possible to adjust the flow of the Nitrogen over the full range of the flowmeter? ___ (Y)

6.10.4.3 Set the Nitrogen flow to 2 l/min.

6.10.4.4 After the value stabilizes, is the O_2 concentration 64 to 70%? ___ (Y)

6.10.4.5 Close the Nitrogen flow valve.

6.10.4.6 Is the correct flow control knob and label attached to the Nitrogen flow control valve? ___(Y)

(✓) 6.10.5 Carbon Dioxide Flowmeter - If applicable

6.10.5.1 Set the gas selector to ALL GAS, if applicable. Is it possible to adjust the flow of the Carbon Dioxide over its range of 550 ml/min.? ___ (Y)

6.10.5.2 Set the Oxygen flow to 1000 ml/min.

6.10.5.3 Set the Carbon Dioxide flow to 500 ml/min.

6.10.5.4 After the value stabilizes, is the O_2 concentration 64 to 70%? ___ (Y)

6.10.5.5 Close the Carbon Dioxide flow valve.

6.10.5.6 Readjust the Oxygen flow to 4 l/min.

6.10.5.7 Is the correct flow control knob and label attached to the Carbon Dioxide flow control valve? ___ (Y)

(✓) 6.10.6 Air Flowmeter - If applicable

6.10.6.1 If not configured with an Air Cylinder yoke, attach the Air Pipeline hose.

6.10.6.2 Set the gas selector to ALL GAS, if applicable. Is it possible to adjust the flow of the Air over the full range of the flowmeter? ___ (Y)

6.10.6.3 Set the Air flow to 2 l/min.

6.10.6.4 After the value stabilizes, is the O_2 concentration 71 to 77%? ___ (Y)

6.10.6.5 Close the Air flow control valve.

6.10.6.6 Is the correct flow control knob and label attached to the Air flow control valve? ___ (Y)

6.10.7 Nitrous Oxide Flowmeter

6.10.7.1 Set the Nitrous Oxide flow to 2 l/min.

6.10.7.2 After the value stabilizes, is the O_2 concentration 64 to 70% ___ (Y)

6.10.7.3 Is the correct flow control knob and label attached to the Nitrous Oxide flow control valve? ___ (Y)

6.10.7.4 Is it possible to adjust the flow of Nitrous Oxide over the full range of the flowmeter? ___ (Y)

6.10.8 Oxygen Ratio Control - If applicable

6.10.8.1 Open the Nitrous Oxide flow control valve to the stop position.

(✓) 6.10.8.2 After the value stabilizes, is the O_2 concentration 21 to 29%? ___(Y)

6.10.8.3 Set the Oxygen flow to 2 l/min.

(✓) 6.10.8.4 After the value stabilizes, is the O_2 concentration 21 to 29%? ___ (Y)

6.10.8.5 Set the Oxygen flow to 1 l/min.

(✓) 6.10.8.6 After the value stabilizes, is the O_2 concentration 21 to 29%? ___ (Y)

6.10.8.7 Reduce the O_2 flow to 500 ml/min. Verify that the N_2O flow is greater than or equal to 600 ml/min.

6.10.8.8 Close the Oxygen flow control valve.

6.10.8.9 Close the Nitrous Oxide flow control valve.

6.10.9 Oxygen Ratio Monitor Controller - If applicable

6.10.9.1 Close the Oxygen flow control valve.

6.10.9.2 * Set the Gas Selector switch to "O_2+N_2O".

6.10.9.3 Slowly increase the Oxygen flow until Nitrous Oxide begins to flow. Is the oxygen flow rate 200 to 400 ml/min.? ___ (Y)

6.10.9.4 Slowly increase the Oxygen flow until the "O_2/N_2O FLOW RATIO" LED on the alarm panel is lighted. Is the nitrous oxide flow rate 150-300 ml/min, or 700-800 if configured with Minimum O_2 Flow Elimination? ___ (Y)

6.10.9.5 Set the oxygen flow to 1000 ml/min.

6.10.9.6 Open the nitrous oxide flow control valve to the stop position.

6.10.9.7 Is the "O_2/N_2O FLOW RATIO" alarm activated? ___ (Y)

(✓) 6.10.9.8 After the value stabilizes, is the oxygen concentration 21 to 29%? ___(Y)

6.10.9.9 Adjust the oxygen flow to 2 l/min.

(✓) 6.10.9.10 After the value stabilizes, is the oxygen concentration 21 to 29%? ___(Y)

6.10.9.11 Adjust the oxygen flow to 4 l/min.

(✓) 6.10.9.12 After the value stabilizes, is the oxygen concentration 21 to 29%? ___ (Y)

6.10.9.13 Is the "O_2/N_2O FLOW RATIO" alarm activated? ___ (Y)

6.10.9.14 * Set the Gas Selector switch to ALL GASES.

6.10.9.15 * Is the "O_2/N_2O FLOW RATIO" alarm activated? ___ (N)

6.10.9.16 * Set the Gas Selector switch to "O_2+N_2O".

6.10.9.17 Close the oxygen flow control valve.

6.10.9.18 What is the flow of nitrous oxide? ___ ml/min. (0)

6.10.9.19 Is the "O_2/N_2O FLOW RATIO" alarm activated? ___ (N)

6.10.9.20 Close the nitrous oxide flow control valve.

* Does not apply to 2-gas machines.

(✓) 6.10.10 Auxiliary Oxygen Flowmeter - If applicable

6.10.10.1 Connect a test pressure monitor to the outlet using a PDM/ Suction adapter (P/N 4115038).

6.10.10.2 Increase the pressure to 50 cm H_2O.

6.10.10.3 After 10 seconds, is the pressure within 40 to 60 cm H_2O? ___ (Y)

6.10.10.4 Remove the test gauge and adapter.

6.10.10.5 Is it possible to adjust the flow over the full range of the flowmeter? ___(Y)

6.10.10.6 Set the flow rate to 5 l/min.

6.10.10.7 Hold the Oxygen sensor at the flowmeter outlet.

6.10.10.8 After the value stabilizes, is the O_2 concentration within 80 to 100% ___ (Y)

6.10.10.9 Replace the Oxygen sensor into the Inspiratory valve dome.

6.10.10.10 Close the Auxiliary Oxygen flow control valve.

(✓) 6.11 HIGH PRESSURE REGULATOR - Six Month Service Interval; Due Date _____

6.11.1 N_2O Regulator

NOTE: Minimum cylinder pressure for N_2O regulator test is 600 psi.

6.11.1.1 Configure the test gauge (P/N 4114807) using a N_2O nut/stem DISS connector (P/N 4114830-004) on the hose, and N_2O DISS body connector (P/N 4114830-003) on the valve body side. If the machine is configured with CSA style fittings reverse the position of the connectors.

6.11.1.2 Connect the test fixture hose to the machine's Nitrous Oxide pipeline inlet.

6.11.1.3 Connect the Nitrous Oxide pipeline supply hose to the test fixture.

6.11.1.4 Open the Nitrous Oxide and the Oxygen cylinder valves.

6.11.1.5 Set the Oxygen and Nitrous Oxide flows to 4 l/min.

6.11.1.6 Depress the push button on the test device.

(✓) 6.11.1.7 Release the push button. After the pressure decay stabilizes, is the regulator output pressure 40 to 49 psi? ___(Y)

6.11.1.8 Remove the test fixture.

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

6.11.2 Air Regulator - If applicable

NOTE: Minimum cylinder pressure for Air regulator test is 1000 psi.

6.11.2.1 Configure the test gauge (P/N 4114807) using an Air nut/stem DISS connector (P/N 4114830-002) on the hose and a DISS body connector (P/N 4114830-001) on the valve body side. If the machine is configured with CSA style fittings reverse the position of the connectors.

6.11.2.2 Connect the test fixture hose to the machine's Air pipeline inlet.

6.11.2.3 Connect the Air pipeline supply hose to the test fixture.

6.11.2.4 Set the Air flow to 4 l/min.

6.11.2.5 Depress the push button on the test device.

(✓) 6.11.2.6 Release the push button. After the pressure decay stabilizes, is the regulator output pressure within tolerance given in the following table? ___ (Y)

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

Cylinder Pressure psi	USA Compensated Regulator output tolerances	ISO Compensated Regulator output tolerances
2000	38 to 44	41 to 47
1800	39 to 45	42 to 48
1600	40 to 46	43 to 49
1400	41 to 47	44 to 50
1200	42 to 48	45 to 51
1000	43 to 49	46 to 52

6.11.2.7 Remove the test fixture.

6.11.3 O_2 Regulator

NOTE: Minimum cylinder pressure for O_2 regulator test is 1000 psi.

6.11.3.1 Configure a test gauge (P/N 4114807) using an O_2 nut/stem DISS connector (P/N 4114830-006) on the hose and an O_2 DISS body connector (P/N 4114830-005) on the valve body side. If the machine is configured with CSA style fittings reverse the position of the connectors.

6.11.3.2 Connect the test fixture hose to the machine's Oxygen pipeline inlet.

6.11.3.3 Connect the Oxygen pipeline supply hose to the test fixture.

6.11.3.4 Set the Oxygen flow to 4 l/min.

6.11.3.5 Depress the push button on the test device.

(✓) 6.11.3.6 Release the push button. After the pressure decay stabilizes, is the regulator output pressure within the tolerance given in the following table? ___ (Y)

NOTE: If a pressure decrease does not occur, either the hospital's supply pressure is too low or the regulator pressure is set too high.

Cylinder Pressure psi	USA Compensated Regulator output tolerances	ISO Compensated Regulator output tolerances
2000	38 to 44	41 to 47
1800	39 to 45	42 to 48
1600	40 to 46	43 to 49
1400	41 to 47	44 to 50
1200	42 to 48	45 to 51
1000	43 to 49	46 to 52

(✓) 6.12 LOW O_2 SUPPLY - Six Month Service Interval

6.12.1 Close the Oxygen cylinder valve and drain all Oxygen pressure.

6.12.2 Depress the push button on the test device.

6.12.3 Adjust the Oxygen flow to 500 ml/min.

6.12.4 Release the test device push button.

6.12.5 Is the pressure on the test gauge when the LO O_2 SUPPLY message appears within 34 to 40 psi? ___ (Y)

6.12.6 Remove the test equipment.

6.13 OXYGEN SUPPLY FAILURE PROTECTION

6.13.1 Connect all pipeline supplies.

6.13.2 Close the Oxygen flow control valve if applicable.

(✓) 6.13.3 *Is the flow of Oxygen 100 to 200ml/min; or 0 ml/min for Minimum O_2 Flow Elimination? ___ (Y)

6.13.4 Open the Nitrous Oxide flow control valve.

(✓) 6.13.5 *Is the flow of Nitrous Oxide 375 to 750 ml/min.; or 0 ml/min if without Bypass? ___ (Y)

6.13.6 Adjust the Oxygen, Nitrous Oxide and additional gas flow to 4 l/min. Set Carbon Dioxide Flow to 500 ml/min., if applicable.

6.13.7 Disconnect the Oxygen pipeline supply and close the Oxygen cylinder valve.

(✓) 6.13.8 Do all flows cease when the Oxygen pressure is depleted? ___(Y)

6.13.9 Reconnect the Oxygen pipeline supply.

6.13.10 Close all cylinder valves and then disconnect the Nitrous Oxide pipeline supply, and Air pipeline if applicable.

6.13.11 Drain the cylinder contents then reconnect the pipeline supplies.

6.13.12 Close all flow control valves.

* Nitrous Oxide Bypass flow and Minimum Oxygen flow specifications are given @ 50 psi. Pipeline pressure deviations may affect these tests.

6.14 PRESSURE MONITOR

6.14.1 Disconnect the breathing pressure sensor line from the absorber.

6.14.2 Connect a PDM Adapter (P/N 4115043) and test pressure gauge to the breathing pressure sensor line.

6.14.3 Adjust the test pressure to 0 cm H_2O.

6.14.4 Simultaneously set AUTO/BAG valve to AUTO, or set the Ventilator switch to the ON position and start a stopwatch.

(✓) 6.14.5 Does the APNEA PRESSURE appear on the alarm display as a CAUTION within 13 to 17 seconds? ___ (Y)

(✓) 6.14.6 Increase the test pressure slowly. Does the APNEA PRRESSURE alarm deactivate within 10 to 14 cm H_2O? ___ (Y)

6.14.7 First decrease the pressure then increase the test pressure above the threshold line shown on the display, and begin timing with a stopwatch.

(✓) 6.14.8 Does the CONTINUOUS PRES appear as a warning within 13 to 17 seconds? ___ (Y)

(✓) 6.14.9 Decrease the pressure slowly. Does the CONTINUOUS PRES alarm deactivate within 10 to 14 cm H_2O? ___ (Y)

(✓) 6.14.10 Increase the test pressure slowly. Does a VENT PRESS HI activate as a warning alarm within 47 to 53 cm H_2O? ___ (Y)

(✓) 6.14.11 Create a sub-atmospheric test pressure slowly. Does the SUB ATM PRES warning alarm activate within -7 to -13 cm H_2O? ___ (Y)

6.14.12 Set the AUTO/BAG valve to BAG, or set the Ventilator switch to the off position.

6.14.13 Open APL valve.

6.14.14 Remove the test equipment and reconnect the breathing pressure sensor line to the absorber.

6.15 VENTILATOR

NOTE: Readjustment of inspiratory flow to limit the inspiratory plateau may be required to reduce erratic tidal volumes and breath rates caused by artifact volumes.

6.15.1 Remove the bellows hose and the scavenger hose at the ventilator relief valve. Remove the bellows sub-assembly and remove bellows.

6.15.2 Visually inspect the bellows for deterioration particularly at its seams and corrugations.

6.15.3 Verify the presence of it's sealing O-ring and reassemble the components.

6.15.4 Turn on the ventilator on using the ON/OFF knob.

6.15.5 If applicable, does the FAULT indicator turn on? (Y)

6.15.6 Set the AUTO/MAN selector switch to AUTO.

6.15.7 If applicable, does the FAULT indicator turn off? (Y)

6.15.8 Set the FREQUENCY to 10 BPM.

(✓) 6.15.9 If applicable, press and hold the EXTENDED RANGE switch and set the I:E ratio to 2:1. Using a stopwatch, time the extended I:E ratio. Is the inspiratory time within 3.6 to 4.4 seconds and the expiratory time between 1.8 to 2.2 seconds? ___ (Y)

(✓) 6.15.10 Set the I:E RATIO to 1:2. Using a stopwatch, time the I:E ratio. Is the inspiratory time between 1.8 to 2.2 seconds and the expiratory time within 3.6 to 4.4 seconds? ___ (Y)

6.15.11 Adjust the Oxygen flow to 500 ml/min.

6.15.12 Set the Tidal Volume to 1200, or if testing an external pediatric bellows set the tidal volume to approximately 300 ml.

6.15.13 Attach a patient circuit to the absorber system.

6.15.14 Set the pressure limit control to MAX, if applicable.

6.15.15 Adjust the Inspiratory Flow to the bottom of the LOW zone.

6.15.16 Occlude the Y-piece.

6.15.17 Press the O_2 Flush momentarily to inflate the bellows.

6.15.18 Adjust the Inspiratory Flow until a peak pressure of 80 cm H_2O is achieved.

(✓) 6.15.19 If applicable, set the Pressure Limit Control to within the 30 range. Readjust within the band as necessary to achieve proper value. Is the peak pressure at the 30 range within 27 to 33 cm H_2O? ___ (Y)

(✓) 6.15.20 If applicable, set the Pressure Limit Control to the MIN position. Is the peak pressure at the MIN range 0 to 15 cm H_2O? ___ (Y) Return the Pressure Limit control to MAX.

6.15.21 Loosen the expiratory valve dome, or if equipped with an ultrasonic flow sensor, open the Y-piece and disconnect the hose attached to the exhalation valve and blow into it.

(✓) 6.15.22 Does the Reverse Flow message appear on the display? ___ (Y)

6.15.23 Tighten the expiratory valve dome if applicable, or if equipped with an ultrasonic flow sensor reconnect the hose between the expiratory valve and the flow sensor.

6.15.24 Insert a test minute volumeter in between absorber dome and Spiromed, or exhalation valve and absorber dome if equipped with an ultrasonic flow sensor.

6.15.25 Open the Y-piece.

6.15.26 Turn the ventilator off. Is the VOL-ALRM OFF message displayed in the Advisory column? (Y) If not, press the APNEA ALARMS DISABLE key.

6.15.27 Turn the ventilator on and start a stop watch.

(✓) 6.15.28 Does APNEA-VOLUME appear as a Caution within 13 to 17 seconds? ___ (Y)

6.15.29 Attach a 3 liter breathing bag to the Y-piece.

NOTE: Bag should be placed on a flat horizontal surface to reduce artifact volume.

6.15.30 Press the O_2 Flush momentarily to inflate the bellows.

6.15.31 Set the Inspiratory Flow to the MED and readjust as necessary to fully collapse the bellows.

(✓) 6.15.32 Observe the operation of each unidirectional valve disc at eye level. Does the inspiratory valve disc raise only during the inspiration phase, and the expiratory valve raise only during the exhalation phase? ___(Y)

(✓) 6.15.33 Is the tidal volume on the volume monitor and on the test volumeter within 20 % of each other? ___ (Y)

6.15.34 Does the volume monitor display 10 BPM? ___ (Y)

6.15.35 Does the display correctly track the Breathing Pressure waveform? ___ (Y)

6.15.36 If ventilator is and AV2 or AV2+ skip this test. Adjust the FREQUENCY and I:E RATIO through the following settings and verify that the ventilator cycles properly:

FREQ	I:E RATIO	FREQ	I:E RATIO	FREQ	I:E RATIO
11	1:1	22	1:1.5	33	1:2
44	1:2.5	55	1:3	66	1:3.5
77	1:4	88	1:4.5	99	1:4.5
00	1:4.5	10	1:2		

6.16 BELLOWS ADULT - If applicable

(✓) 6.16.1 Is the tidal volume indicated on the test volumeter 960 to1440 ml? ___(Y)

(✓) 6.16.2 Does the bellows remain fully inflated during the expiratory pause phase? ___ (Y)

6.16.3 Remove the ventilator hose from the VENTILATOR HOSE terminal.

6.16.4 Attach a test terminal to the bellows assembly ventilator hose terminal.

6.16.5 Connect a 0-250 ml/min. flowmeter (P/N S000081) to the test terminal.

6.16.6 Set the FREQUENCY to 1 BPM.

(✓) 6.16.7 Is the drive gas leakage indicated during the inspiratory phase 0 to 50 ml? ___(Y)

6.16.8 Remove the test equipment from the ventilator hose terminal and reconnect the ventilator hose to the VENTILATOR HOSE terminal.

6.16.9 Set the FREQUENCY to 10 BPM.

6.16.10 Adjust the O_2 flow to 10 l/min.

6.16.11 Adjust the Tidal Volume to maximum.

6.16.12 Press the O_2 Flush momentarily to inflate the bellows.

6.16.13 Adjust the INSPIRATORY FLOW to fully compress the bellows.

(✓) 6.16.14 Is the Tidal Volume on the test volumeter greater than 1400 ml? ___(Y)

(✓) 6.16.15 Is the PEEP value displayed on the monitor 0 to 3 cm H_2O? ___(Y)

6.16.16 Remove the breathing bag from the Y-piece and replace it with a test lung.

6.16.17 Adjust the Oxygen flow to 300 ml/min.

6.16.18 Adjust the Tidal Volume to 200 ml.

6.16.19 Does the bellows stop adjust smoothly and engage properly? ___ (Y)

6.16.20 Adjust the INSPIRATORY FLOW to fully compress the bellows.

(✓) 6.16.21 Is the Tidal Volume on the test volumeter 125 to 250 ml? ___(Y)

6.16.22 Close the Oxygen flow control valve.

6.16.23 Remove the test lung, set the AUTO/BAG selector valve to BAG and set the ventilator switch to the off position if applicable.

6.16.24 Press the VOLUME ALRMS DISABLE and the APNEA ALRM DISABLE keys.

6.17 BELLOWS PEDIATRIC EXTERNAL - If applicable

6.17.1 Adjust the fine flow control of the pediatric bellows attachment fully clockwise.

6.17.2 Remove the breathing bag from the Y-piece and replace it with a test lung (P/N 4115128).

6.17.3 Press the O_2 Flush momentarily to inflate the bellows.

(✓) 6.17.4 Does the bellows remain fully inflated during the expiratory pause phase? ___ (Y)

6.17.5 Set the ventilator frequency to 20 BPM.

6.17.6 Adjust the O_2 flow to 3 l/min.

(✓) 6.17.7 Is the tidal volume on the test volumeter greater than 250 ml? ___(Y)

6.17.8 Adjust the tidal volume to the 100 ml mark on the pediatric bellows assembly.

(✓) 6.17.9 Is the tidal volume on the test volumeter within 65 to 135 ml? ___ (Y)

6.17.10 Verify that with the Pediatric Bellows Fine Flow Control turned fully counter-clockwise the bellows does not collapse during inspiration. Readjust the knob to the fully clockwise position.

6.17.11 Adjust the O_2 flow to 10 l/min.

(✓) 6.17.12 Is the PEEP displayed on the monitor 0 to 3 cm H_2O? ___ (Y)

6.17.13 Close the Oxygen flow control valve.

6.17.14 Remove the ventilator hose from the VENTILATOR HOSE terminal.

6.17.15 Attach a test terminal (P/N 4104389) to the bellows assembly ventilator hose terminal.

6.17.16 Connect a 0-250 ml/min. flowmeter (P/N S000081) to the test terminal.

6.17.17 Set the FREQUENCY to 1 BPM.

6.17.18 Set the I:E RATIO to 1:1.

6.17.19 Set the Inspiratory Flow to MAX.

(✓) 6.17.20 Is the drive gas leakage indicated during the inspiratory phase 0 to 50 ml/min? ___ (Y)

6.17.21 Remove the test equipment and reattach the ventilator hose to the VENTILATOR HOSE terminal.

6.17.22 Set AUTO/BAG valve to BAG and set the ventilator switch to the off position if applicable.

6.17.23 Press the VOLUME ALRMS DISABLE and the APNEA ALRM DISABLE keys.

6.18 BELLOWS PEDIATRIC INTERNAL - If applicable

6.18.1 Remove the breathing bag from the Y-piece and replace it with a test lung (P/N 4115128).

6.18.2 Press the O_2 Flush momentarily to inflate the bellows.

(✓) 6.18.3 Does the bellows remain fully inflated during the expiratory pause phase? ___ (Y)

6.18.4 Set the ventilator frequency to 20 BPM.

6.18.5 Set the Oxygen flow to 3 liters.

(✓) 6.18.6 Is the tidal volume on the test volumeter greater than 250 ml? ___ (Y)

6.18.7 Adjust the inspiratory flow and Pressure limit control if applicable control until the bellows collapses to the 100 ml mark on the pediatric bellows assembly.

(✓) 6.18.8 Is the tidal volume on the test volumeter 65 to 35 ml? ___ (Y)

6.18.9 Adjust the Oxygen flow to 10 l/min.

(✓) 6.18.10 Is the PEEP displayed on the monitor within 0 to 3 cm H_2O? ___ (Y)

6.18.11 Close the Oxygen flow control valve.

6.18.12 Remove the ventilator hose from the ventilator hose terminal.

6.18.13 Attach a test terminal to the bellows assembly ventilator hose terminal.

6.18.14 Connect a flowmeter test stand (P/N S000081) to the test terminal.

6.18.15 Set the frequency to 1 BPM.

6.18.16 Set the I:E RATIO to 1:1.

(✓) 6.18.17 Is the flow indicated during the inspiratory phase less than 50 ml? ___ (Y)

6.18.18 Remove the test equipment and reattach the ventilator hose to the VENTILATOR HOSE terminal.

6.18.19 Return pressure limit control to MAX.

6.18.20 Set AUTO/BAG valve to BAG and set the ventilator switch to the off position if applicable.

6.18.21 Press the VOLUME ALRMS DISABLE and the APNEA ALRM DISABLE keys.

(✓) 6.19 OPEN RESERVOIR SCAVENGER 6-Month Service Interval; Due Date _____, If applicable

NOTE: If the ambient air in the local environment contains a significant amount of dust and lint, the cleaning frequency must be increased to compensate for these conditions.

6.19.1 OPEN RESERVOIR SCAVENGER CLEANING

6.19.1.1 Remove the scavenger hoses and drain all accumulated moisture. Inspect all scavenger hoses for deterioration and replace as needed.

6.19.1.2 Disconnect the hospital vacuum source from the scavenger.

6.19.1.3 Cleaning procedure for assemblies with 2 large relief ports. If configured with many small vent ports skip to step.

1. Remove the four screws securing the reservoir tube to the main block. Examine the two sealing O-rings and replace as necessary.
2. Remove the screws securing the access panel at the bottom of the scavenger canister.
3. Remove and inspect the silencer; replace if needed.

4. Clean the reservoir tube with compressed air if necessary.
5. Remove the flowmeter from its housing by turning it counterclockwise.
6. Inspect the tube and clean with compressed air if needed.
7. Apply vacuum to the port at top of the flowmeter housing.
8. Go to step 6.19.2.5.

6.19.1.4 Cleaning procedure for assemblies with many small vent ports.

1. Remove the scavenger mounting screws.
2. Remove the scavenger flow control needle valve assembly. Inspect the needle valve and seat for lint or dust accumulation. Clean with compressed air if necessary.
3. Remove the hardware securing the flowmeter. Remove the brass retainer at the bottom of the assembly. Inspect the for lint or dust accumulation. Clean with compressed air if necessary.
4. Unthread the reservoir canister from the body.
5. Remove the hardware securing the tube assembly to the block. Inspect for lint or dust accumulation. Clean with compressed air if necessary and replace O-rings if necessary.
6. Probe all gas passages of the block to ensure there are no occlusions. Clean with compressed air if necessary.

6.19.1.5 Reassemble the scavenger assembly, attach the scavenger hose and reactivate the vacuum source.

6.19.2 OPEN RESERVOIR PRESSURE TESTING

6.19.2.1 Activate the Scavenger vacuum supply.

6.19.2.2 Turn the scavenger needle valve fully clockwise (closed).

6.19.2.3 Uncap the hose barb adapter at the rear of the scavenger and connect a test pressure monitor to the hose barb on the adapter using a PDM/Suction Adapter (P/N 4115038). If the scavenger does not contain a hose barb adapter install a scavenger adapter (P/N 4108114) between the 19-mm hose terminal on the scavenger and the scavenger hose.

6.19.2.4 Interconnect the inspiratory and expiratory valves or expiratory port on the ultrasonic flow sensor, if applicable with a 22-mm hose.

6.19.2.5 Attach a Breathing System Leak Test Device (P/N S010159) to the bag mount.

6.19.2.6 Set the AUTO/BAG valve to the BAG position.

6.19.2.7 Open the APL valve.

6.19.2.8 Set the Oxygen flow on the anesthesia machine to 8 l/min.

6.19.2.9 The test pressure gauge shall indicate a pressure of less than 1.0 cm H_2O.

6.19.2.10 Close all flow control valves on the anesthesia machine.

6.19.2.11 Adjust the scavenger needle valve until the flowmeter indicates between the white lines.

6.19.2.12 What is the pressure on the test gauge? ___ cm H_2O (0 to -0.5)

6.19.2.13 Remove the test equipment, re-cap the scavenger adapter port or remove the scavenger adapter and reconnect the scavenger hose.

(✓) 6.20 A/C SCAVENGER - 6 Month Service Interval; Due Date _____, If applicable

NOTE: If the ambient air in the local environment contains a significant amount of dust and lint, the cleaning frequency must be increased to compensate for these conditions.

6.20.1 A/C SCAVENGER CLEANING

6.20.1.1 Remove the scavenger hoses and drain any accumulated moisture. Inspect the hoses for deterioration, then reinstall or replace it if needed.

6.20.1.2 Remove the safety relief valve housing by unscrewing it in a counter-clockwise direction.

6.20.1.3 Inspect the O-ring and replace it if needed.

6.20.1.4 Remove the safety relief valve from its housing by twisting it out in a counter-clockwise direction. The tips of needle nose pliers can be used to turn the valve. Be careful not to damage the valve's fragile disk.

6.20.1.5 Remove any accumulated lint or dust from the valve with a soft brush. The valve may be further cleaned with a low flow of Air or Oxygen. The scavenger body can be cleaned with a moist cloth.

6.20.1.6 Reinstall the valve into the housing, making sure that it is threaded all the way into the housing and that the plastic washer is properly seated on its upper surface.

6.20.1.7 Reinstall the valve housing onto the scavenger body, making sure that the O-ring is properly seated.

6.20.2 AC SCAVENGER TESTING

6.20.2.1 Set the AUTO/BAG valve to the BAG position.

6.20.2.2 Open the APL valve.

6.20.2.3 Occlude the bag mount connector with a Breathing System Leak Test Device (P/N S010159).

6.20.2.4 Interconnect the inspiratory and expiratory valves or expiratory port on the ultrasonic flow sensor, if applicable with a 22-mm hose.

6.20.2.5 Set the Oxygen flow on the anesthesia machine to 8 l/min.

6.20.2.6 Install a scavenger adapter (P/N 4108114) between the 19-mm hose terminal on the scavenger and the scavenger hose.

6.20.2.7 Connect a test pressure monitor to the hose barb on the adapter using a PDM/Suction Adapter (P/N 4115038).

6.20.2.8 Remove the transfer hose from the bottom of the scavenger and occlude this port.

6.20.2.9 What is the pressure on the test gauge? ___ cm H_2O (5 to 10)

6.20.2.10 Remove the test equipment and reconnect the scavenger hose and the transfer hose.

6.20.2.11 Close the Oxygen flow control valve.

(✓) 6.21 BAG SCAVENGER - Six Month Service Interval; Due Date _____, If applicable

NOTE: If the ambient air in the local environment contains a significant amount of dust and lint, the cleaning frequency must be increased to compensate for these conditions.

6.21.1 BAG SCAVENGER CLEANING

6.21.1.1 Remove the scavenger hoses and drain any accumulated moisture. Inspect the hoses for deterioration, then reinstall or replace as needed.

6.21.1.2 Remove the reservoir bag and drain any accumulated moisture and inspect it for deterioration, then reinstall or replace as needed. All under sized or single use bags must be replaced with 5-liter reusable style reservoir bag.

6.21.1.3 Remove the plastic valve cover on the front surface of the scavenger body by turning it in a counter-clockwise direction.

6.21.1.4 Remove the valve and washer from the scavenger body by turning it counter-clockwise. A needle-nose pliers may be used to turn the valve, but use care not to damage the valve's fragile disk.

6.21.1.5 Brush any accumulated lint or dust off the valve with a soft brush. The valve may be further cleaned with a low flow of clean Air or Oxygen.

6.21.1.6 Reinstall the plastic washer and valve into the scavenger body. Replace the valve cover.

6.21.1.7 Unscrew the valve housing on the left side of the scavenger body by turning its fitting counter-clockwise with a wrench.

6.21.1.8 Unscrew the valve from the housing by turning it in a counterclockwise direction.

6.21.1.9 Brush any accumulated lint or dust off the valve with a soft brush. The valve may be further cleaned with a low flow of clean Air or Oxygen.

6.21.1.10 Reinstall the valve in the housing, and then reinstall the housing into the scavenger body.

NOTE: This valve does not require washers or O-rings.

6.21.1.11 Remove the valve housing on the right side of the scavenger body by turning it counter-clockwise.

6.21.1.12 Inspect the rubber O-ring and replace if worn.

6.21.1.13 Remove the valve from the housing by turning it counterclockwise. A needle-nose pliers may be used to turn the valve, but use care not to damage the valve's fragile disk.

6.21.1.14 Brush any accumulated lint or dust off the valve with a soft brush. The valve may be further cleaned with a low flow of clean Air or Oxygen.

6.21.1.15 Reinstall the valve and plastic washer into the housing.

6.21.1.16 Reinstall the valve housing onto the scavenger body, making sure that the O-ring is properly seated.

6.21.2 BAG SCAVENGER TESTING

6.21.2.1 Activate the Scavenger vacuum supply.

6.21.2.2 Turn the scavenger needle valve fully clockwise (closed).

6.21.2.3 Install a scavenger adapter (P/N 4108114) between the 19-mm hose terminal on the scavenger and the scavenger hose.

6.21.2.4 Connect a test pressure monitor to the hose barb on the adapter using a PDM/Suction Adapter (P/N 4115038).

6.21.2.5 Set the AUTO/MAN valve to the BAG position.

6.21.2.6 Connect a 22mm breathing hose between the absorber's inspiratory valve and expiratory valve or expiratory hose terminal on the ultrasonic flow sensor, if applicable.

6.21.2.7 Open the APL valve.

6.21.2.8 Occlude the bag mount connector.

6.21.2.9 Press the O_2 Flush button to inflate the scavenger reservoir bag.

6.21.2.10 Open the Oxygen flow control valve to 8 l/min.

6.21.2.11 Does the reading on the test gauge indicate a pressure less than or equal to 10.0 cm H_2O? ___(Y)

6.21.2.12 Adjust the scavenger needle valve to allow typical suction through the scavenger.

6.21.2.13 Close all flow control valves on the machine.

6.21.2.14 Does the gauge indicate a pressure of less than or equal to -1.0 cm H_2O? ___(Y)

6.21.2.15 Remove the test equipment and reconnect the scavenger hose.

6.21.2.16 Close the Oxygen flow control valve.

(✓) 6.22 SUCTION REGULATOR - 6-month Service Interval; Due Date _____, If applicable

6.22.1 Set the vacuum on/off valve to the ON position.

6.22.2 Set the regulator to indicate 250 mm Hg.

6.22.3 Connect a digital pressure meter to the collecting inlet stem of the suction bottle.

6.22.4 Set the digital pressure meter to the mm Hg scale.

6.22.5 Is the vacuum indicated on the digital pressure meter within 200 to 300 mm Hg? ___ (Y)

6.22.6 Set the vacuum on/off valve to the OFF (vertical) position.

6.22.7 Turn the vacuum control knob fully counter-clockwise.

(✓) 6.23 MANUAL SPHYGMOMANOMETER - 6-month Service Interval; Due Date _____, If applicable

6.23.1 Insert the male Luer fitting of the Sphygmomanometer squeeze bulb hose assembly into the female Luer fitting labeled BP BULB on the front of the machine.

6.23.2 Insert an NIBP-Luer Test Adapter (P/N 4116111-001) inline between the blood pressure cuff and the extension hose.

6.23.3 Wrap the blood pressure cuff around an “E” cylinder.

6.23.4 Hand-pump the squeeze bulb until pressure of 200 mm Hg is indicated on the test gauge and start a stop watch.

6.23.5 Does the Sphygmomanometer indicate within 180 to 220 mm Hg? ___ (Y).

6.23.6 After thirty (30) seconds, is the pressure on the Sphygmomanometer gauge within 190 to 200 mm Hg? ___ (Y)

6.23.7 Remove test equipment.

6.23.8 Remove the blood pressure cuff from the “E” cylinder.

6.23.9 Does the Sphygmomanometer indicate within the band? ___ (Y)

6.24 FINAL TESTS

(✓) 6.24.1 Is the machine’s Operator’s Instruction manual in close proximity of the machine? ___ (Y)

6.24.2 Does the table lamp work properly if fitted? ___ (Y)

6.24.3 Verify all cylinder pressure gauges indicate zero.

6.24.4 Verify the pipeline hoses are connected to the hospital pipeline.

6.24.5 Verify the APL valve knob is turned completely counterclockwise (fully open).

6.24.6 Place the AUTO/BAG selector in the BAG position.

6.24.7 Verify the ventilator hose is connected between the Auto/Man valve and Ventilator hose terminal.

6.24.8 Verify the pressure pilot line is connected between the machine interface and absorber.

6.24.9 Verify the Oxygen sensor is removed from the inspriatory valve dome adapter.

6.24.10 Verify the inspriatory valve dome is plugged.

6.24.11 Unplug the machine's AC power cord, then press and hold the "BATTERY TEST" button. Is green Battery Test LED lighted? ___ (Y)

6.24.12 Plug the power cord back into the original AC receptacle.

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